F-16 Combat Pilot

Spectrum, Amstrad CPC, Commodore C64/C128

Introduction

Welcome to the world of the F-16 combat pilot. In this award-winning flight simulation you will experience the thrills of flying one of the world's most advanced multi-role combat aircraft on missions ranging from air-to-air interception to battlefield attack. In addition to single missions F-16 Combat Pilot allows you to participate in Operation Conquest - a multi-mission strategic conflict involving real-time interaction between aircraft, ground forces and military installations. Your experience as an F-16 pilot begins in the first of eight squadrons. Each squadron has a combat zone of roughly 20,000 sq. miles.

Loading instructions

Commodore 64/128 Cassette: Hold **SHIFT & RUN/STOP** keys and press PLAY. Disc: Type **LOAD"*",8,1**. Connect joystick to port 2 and use joystick to select options.
Spectrum Cassette: **LOAD""**. Disc: **Enter**.
Amstrad CPC Cassette: **Ctrl + Enter**. Disc: **RUN"F16**. Cassette versions must first be loaded from side A or side 1, n.b. Two joystick option on Spectrum: In addition to having pitch and roll control as usual on one joystick, it is possible to operate throttle and rudder control on a second joystick.

Keyword protection

After loading the program and selecting the appropriate language, you will be prompted to enter a security keyword from the table attached. Simply find the word that corresponds to the page, paragraph and word number and type it in, followed by enter.

Controls	*Spectrum Amstrad*	*C64*
Roll right	+ →	Right*
Roll left	- ←	Left*
Pitch up	↓	Back*
Pitch down	↑	Fwd*
Rudder right	X**	X
Rudder left	Z**	Z
Increase throttle	A**	+
Decrease throttle	A**	-
Undercarriage	U	U
Wheelbrakes/Airbrakes	B	B
Jettison fuel tanks	K + Shift	J and F
Jettison all	L + Shift	J and A
Eject	E + Shift	Ctrl E
Displays		
Radar target select	S	<
MFD select	D**	1,2,3,4
HUD on/off	H	H
Weapons		
Weapons select	W	F1
Chaff	C	F5
Flares	F	F7
Fire weapons	Space*	FIRE
UFCP		
Autopilot	L	@

Recce pod transmit	R	R
Mode select	M	M
Channel select	N	C
Pause/continue	P	P

*JOYSTICK 1
**JOYSTICK 2 (SPECTRUM)

Spectrum - the program defaults to using a Sinclair joystick plugged into port 1. If you wish to fly using the cursor keys then select cursor control by pressing key 1. If you wish to use the Kempston joystick press key 1 again. It is important to select the correct control otherwise you will not be able to load weapons onto the aircraft.

Mission selection screen

Each side of the pentagon represents a mission category:
Scramble - air-to-air interception. Objective - intercept and destroy two incoming enemy fighters, then return to base.
Hammerblow - offensive counterair operations. Various ground attack missions against military targets including airfields, military bases, command centres, early warning radar installations, SAM and AAA sites. Objective - destroy assigned targets and return to base.
Deepstrike - ground attack on strategic installations including fuel depots, power stations and factories. Objective - destroy assigned targets and return to base.
Tankbuster - battlefield close air support. Objective - locate and destroy tank battalions and return to base.
Watchtower - reconnaissance. Objective - fly over designated targets, transmit data back to HQ using ATARS pod and return to base.

Operation Conquest - in the centre of the pentagon is the icon to select the strategic campaign. This option is not available until you have successfully flown a mission in each category. (n.b. This does not apply to C64 cassette users since they do not have a pilot's log facility.) The objective is to destroy sufficient enemy installations and aircraft in order to force him into surrender. This will take several missions during which the enemy will also be trying to force the allies to surrender. After each successful campaign you will be promoted to the next squadron.
Training - the enemy will not fire at you when this option is ON. Selection of mission category is as before.
Quickstart - bypasses the preflight briefing and weapon selection. Your aircraft is loaded with a general purpose weapon mix and no weapons are loaded into the navigation computer.
Pilot's Log - records successful missions and your squadron level. Make sure that you open a new pilot's log before you first flight or load your old pilot's log. This feature is not available on C64 cassette. For C64 disc users, you will need to have preformatted a blank disc using the following command:

OPEN 1,8,15,"n:LOG,EA"

Spectrum and Amstrad cassette and disc users - follow on-screen prompts.
Exit - move to pre-flight briefing

Pre-flight briefing

Here you will be given your mission objective and target coordinates (not in Scramble). You will also be able to select your flying conditions i.e. clear or cloudy, day or night (not available on C64).

To plan your flight, set your waypoints to match the target coordinates. This is achieved by moving the cursor to the required map location and pressing fire. Waypoints are automatically preloaded on the Spectrum and Amstrad versions. Waypoint 0 is always set to your take-off position. The various symbols on the map correspond to the target types described above.

Weapon Loading

After the pre-flight briefing you will see the weapon loading screen. For any of the five single mission categories e.g. Scramble, etc., you may load your weapons by moving the cursor to the crew's choice and pressing the fire button. All weapons may be removed from the aircraft by selecting "clean". If you wish to load up weapons of your own choice, first move the pointer to the required weapon name e.g. AIM-120, AGM-65E etc, and press the fire button. The weapon name will appear at the top of the screen with the number of the weapon type loaded. Move the cursor to approximately a quarter of an inch underneath the weapon loading point and press the fire button again. The weapons should appear, loaded symmetrically on the aircraft. Further weapons may be loaded by repeating this procedure. If the weapons do not appear try moving the cursor position slightly. Note that the heavier weapons may only be loaded on the inner pylons. The gun, internal fuel and Lantirn are always preloaded. External fuel tanks and the ATARS pod are loaded without having to point to the loading position.
During Operation Conquest the crew's choice option does not function since the crew will not be aware of your objectives. Load your weapons manually.

Weapon types:
AIM-120 AMRAAM - radar-guided medium range air-to-air missile. Maximum range 30 miles.
AIM-9M Sidewinder - infra-red short range air-to-air missile. Maximum range 11 miles.
(Both of the above missiles can only be used with the air radar active and the lock-on diamond visible on the HUD.)
AGM-88A HARM - radar-guided anti-radiation missile for use against EWR sites.
AGM-65D Maverick - infra-red air-to-ground missile for use against tanks.
AGM-65E Maverick - laser-guided air-to-ground missile for use against all ground targets except runways.
The Lantirn system will automatically acquire each ground target as it comes into range. As soon as the lock-on diamond appears, fire the missile. Mavericks and HARM can only be used with the ground radar on and the lock-on diamond active.
Durandal - anti-runway bomb. Drop within enemy airfield to destroy runway.
External fuel tank - up to 3 may be carried if the ATARS pod is not fitted.
ATARS - reconnaissance pod - can be fitted only on the centre line hardpoint.
LANTIRN - night vision & laser guidance system - always fitted.
internal cannon - always fitted - 500 rounds max. Range approximately 0.5 miles. Only used for air-to-air dogfights.
Chaff & flares - 30 of each fitted for use as decoys against incoming missiles. Active only for short period - roughly 30 seconds.
Leave the weapon loading screen by selecting Exit.

Flight - getting airborne and landing.
Take-off:
Once you are in the cockpit begin by opening the throttle to 100% (hold down the Q key on Spectrum and Amstrad or + key on the C64). Release the key and press again to activate reheat (maximum thrust). As your speed approaches 150 kts, pull back on the joystick (or cursor key) to raise the nose of the aircraft and take-off. Remember to raise the undercarriage shortly after take-off otherwise it will be damaged and remain in the down position.

Flying to a target:
Select your required waypoint on the Up Front Control Panel (UFCP) and turn your aircraft until your heading matches the bearing of the waypoint. To achieve the maximum turn rate, bank your aircraft onto a wing tip and pull on the joystick (elevator control). This technique is particularly important during a dogfight when you will be avoiding enemy missiles and using chaff and flares. n.b. If you pull or push for long periods you will "black out" and "red out" respectively. You will regain conciousness in a few seconds.

For clarification, true airspeed is the speed of the aircraft through the air. Indicated airspeed (IAS) as shown of the MFD is true airspeed multiplied by the square root of air density and since air density reduces with altitude, it follows that for any given true airspeed the indicated airspeed will also reduce with altitude. This is important to a pilot since the indicated airspeed when the aircraft stalls will be independent of altitude for any given aircraft weight. The navigation computer uses true airspeed to calculate the estimated time to arrival.

Landing:
Landing your aircraft safely can be the most difficult part of the mission if you are an inexperienced pilot. The best advice is to approach the airfield flying as slowly as possible and also lined up with the runway. This will give you the most time to make corrections if any adjustments are necessary. n.b. If you slow down too much then the aircraft will stall and the nose will drop. This occurs typically between 100kts and 140 kts depending upon the aircraft weight.

Use the mode select key M to put the UFCP into Airfield mode then use the channel select key (N or C) to select the desired airfield A0 to A7. The UFCP will display the range and bearing and time to arrival. All runways are aligned North-South. Approaching from the South will require both aircraft heading and airfield bearing to equal 360°. Likewise, if you approach the airfield from the North, the heading and bearing should both equal 180°. If this condition is not achieved with at least 3 or 4 miles to touchdown then the chances are you will not be lined up with the runway when you arrive at the touchdown.

In order to get lined up correctly a common technique is to adjust your aircraft heading so that it is approximately double the airfield bearing e.g. if the airfield bearing is 40, fly on a course of approximately 80, or if the airfield bearing is 330, fly on a course of 300. As you get nearer to the airfield you should see the bearing gradually change towards 360. Continue to adjust your heading to roughly twice the bearing by turning slowly towards the airfield e.g bearing of 20 and a heading of 40, a bearing of 10 and a heading of 20, and so on. As the bearing continues to approach 360 so will your heading and the result should be both heading and bearing equal to 360 and you are lined up with the runway. The same principle applies for a landing due South, with heading and bearing of 180.

Give yourself plenty of time by performing this manoeuvre at over 10 miles from the runway. If you have already reduced the throttle to 80% and lowered the undercarriage your speed should be between 120 and 140 knots which is a typical approach speed. Use your airbrake if your speed is too high. It is also important to adjust your altitude to approximately 2500 feet. Keep the nose of the aircraft approximately 5° above the horizon and this will ensure a good approach speed and a rate of descent of roughly 11 feet per second. If you find that you are running out of altitude, open the throttle slightly and this will reduce the rate of descent. Attempting to adjust your rate of descent with pitch angle will cause major fluctuations in speed or even a stall and will probably lead to crashing as you overcorrect for errors. Use the ILS display as described below to ensure a good approach. Just prior to touchdown pull the nose of the aircraft up very slightly (flare) to reduce the rate of descent to less than 10 feet per second. It is possible to land with the wheels up but only if the undercarriage is damaged. Your VSI will have to be less than 5 feet per second. After touchdown, reduce the throttle setting to 60% (minimum) and apply the brakes by holding down key B until the aircraft stops.

Autoland option:
During your approach to land at an airfield, you may select the autoland feature providing that the ILS display is active and the localiser and glideslope needles are displayed. Follow the advice above until the localiser and glideslope needles appear on the ILS display and then select autopilot (key L on Spectrum and Amstrad, key @ on the C64). The autopilot will confirm that it has control and it will steer your aircraft towards the runway. Be prepared to take over control just prior to touchdown in order to flare and reduce your rate of descent. Continue to monitor your approach as the autopilot is not infallible.

One last point. If you get into serious trouble you can always eject.....

Debrief

After landing (or crashing!) you will see the debrief screen with a summary of your performance during the mission. If appropriate, you will be given your Kill Ratio (KR) and your Mission Effectiveness (ME).

KR = total number of targets destroyed/ number of weapons used
ME = number of assigned targets destroyed/ total number of assigned targets

After your debrief you will return to the Mission Selection pentagon screen.

Instrument Panel & HUD

Multi Function Displays (MFD):

The information displayed on the three MFDs can be changed using the MFD Select key.

	Left MFD	Centre MFD	Right MFD
Mode 1: Air combat:	Weapons	Air radar	Flight data
Mode 2: Ground attack:	Moving map	Ground radar	Flight data
Mode 3: Landing:	Moving map	ILS	Flight data
Mode 4: Status:	Weapons	Fault status	Flight data

Moving map - shows your current position within the combat zone.
Ground radar - shows range and bearing of ground targets. If more than one target appears on the radar use the target select key. Maximum range of approximately 10 miles.
Air radar - shows range and bearing of enemy aircraft. Maximum range of approximately 30 miles.
ILS - instrument landing system (described later)

Flight data

- **IAS** - indicated airspeed (not true airspeed) knots
- **ALT** - altitude in feet
- **VSI** - vertical speed indicator (rate of climb / descent) feet per sec.
- **HDG** - aircraft heading (direction in which you are flying), degrees
- **FWT** - fuel weight. Fuel consumption increases with rpm and even more so if reheat is used.

Weapons - list of weapons currently loaded

Fault status - shows any system failures:

FBW - fly by wire system
RAD - radar
NAV - navigation computer
HUD - Head Up Display
COM - communications
WPN - weapon system
U/C - undercarriage
OXY - oxygen system
LAN - Lantirn system
ECM - electronic countermeasures jammer
RWR - radar warning receiver
ILS - instrument landing system

Up Front Control Panel (above centre MFD)
Navigation display:
3 modes - Waypoint (W), Airfield (A) and Target (T) selected with the mode select key, M.
RNG - range in miles
BRG - bearing i.e. direction in which you must fly to reach target
ETA - estimated time of arrival , in minutes and seconds (W and A modes only)
ALT - altitude of enemy aircraft (T mode only)

Waypoint mode - channels W1 to W5 - waypoints entered during preflight briefing, selected using key N (Spectrum & Amstrad) or key C (C64). W0 is always set at your take-off position.
Airfield mode - channels A0 to A7 - locations of allied airfields, selected using key N (Spectrum & Amstrad) or key C (C64). Used to navigate your way back to base.
Target mode - T0 only. Used to display range, bearing and altitude of enemy aircraft.

To the left of the navigation display are 6 lights:
P - ATARS reconnaissance pod activated
L - LANTIRN system active
R - air or ground radar active
I - ILS in range
A - autoland active
T - transmit callsign active (of no use on Spectrum, Amstrad or C64 versions)
Below the UFCP you will see the message panel.

Radar Warning Receiver (to the left of the UFCP)
This shows the direction of incoming enemy aircraft.
Range approximately 50 miles.

Threat Warning Panel (to the left of the Radar Warning Receiver)
These 5 lights decode various threats to your aircraft:
S - incoming surface-to-air missile - use chaff or flares & manoeuvre hard!
A - incoming enemy air-to-air missile- use chaff or flares & manoeuvre hard!
E - enemy electronic countermeasures being used in an attempt to break your radar lock or weapon accuracy.
I - incoming enemy fighter aircraft - check radar warning receiver and select T mode on UFCP.
R - you are being tracked by enemy radar. You may be able to break the lock by flying below 500 feet.

Master Caution Light (to the left of the Threat Warning Panel)
Illuminates whenever there is a system failure. Check your fault status display on an MFD.

Attitude Director Indicator (to the right of the UFCP)
Otherwise known as the artificial horizon. Shows pitch and roll of your aircraft - particularly useful when in cloud.

Engine rpm indicator (right hand side of panel)
The engine idles at 60% rpm and at this minimum setting the engine is giving zero thrust. The rpm may be increased to 100% using the throttle control. Additional reheat thrust may be obtained by releasing the throttle control and then pressing it again. The rpm indicator will turn red to show that reheat is selected. Using reheat increases your fuel consumption. Pressing the "decrease throttle" key when in reheat will switch reheat off. To reduce rpm further, release the key and press again.

Undercarriage lights (underneath rpm indicator)
3 greens - undercarriage down
3 reds - undercarriage up

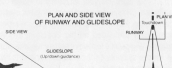
Warning Lights
Fire - (to the right of rpm) - aircraft on fire - eject!
F - fuel low warning
E - external fuel tanks empty
W - wheel brakes on
A - airbrake on

Angle of attack indicator (to the left of the centre MFD)
Shows angle of wings relative to oncoming airflow.

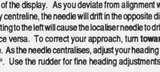
Vertical speed indicator (to the right of the centre MFD)
Shows the rate of climb / descent of your aircraft.

Head Up Display (above the UFCP)
Superimposed upon your view ahead is essential information such as airspeed, heading, altitude and weapon aiming symbology.
Indicated airspeed - left hand vertical scale, calibrated in knots *10.
Altitude - right hand vertical scale, calibrated in 1000's feet.
Heading - horizontal scale at top, calibrated in degrees *10
Target designator box - appears when aircraft is pointing towards target on radar and target is within radar range.
Lock-on diamond - appears within designator box when weapon is locked onto target.
The weapon currently armed appears in the bottom left hand corner of the HUD.

Instrument landing system
This display helps you line up with the runway centre line and approach the airfield whilst descending along the correct glidepath. The system consists of two radio beams transmitted from the airfield to form a cone with its apex at your touchdown point. All runways in this simulation are fitted with an ILS system at both ends. In order for your aircraft to use the ILS system (i.e. become active) you must fly into the cone by approaching the runway from either end, lined up approximately north-south (i.e. on a heading of either 180 or 360) and with an altitude of less than 5000 feet. The ILS system has a range of approximately 10 miles and the cone is widest at this range. If you see the message "ILS inactive" it means that you are not within the ILS beam and autoland will not operate.

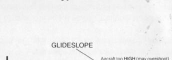


(a) Localiser needle
This is the vertical needle on the ILS display. When you are lined up with the runway centreline, the needle will be in the centre of the display. As you deviate from alignment with the runway centreline, the needle will drift in the opposite direction i.e. drifting to the left will cause the localiser needle to drift right, and vice versa. To correct your approach, turn **towards** the needle. As the needle centralises, adjust your heading to 180° or 360°. Use the rudder for fine heading adjustments.



Deviation from the centreline

(b) Glideslope needle
This is the horizontal needle on the ILS display. When you are approaching the runway along the correct glidepath, the needle will be in the centre of the display. If you drift above the optimum glideslope then the needle will drift **downwards** and vice versa. Respond by increasing your rate of descent if the needle is low or decreasing your rate of descent if the needle is high.



Deviation from the glideslope

To summarise, your ideal approach is achieved by keeping the two needles central. "Fly towards the needle" to correct errors.

Credits
Original program designed by Dave Marshall.
C64 conversion by Chris Smedley. Spectrum and Amstrad conversions by Keith Goodyer.

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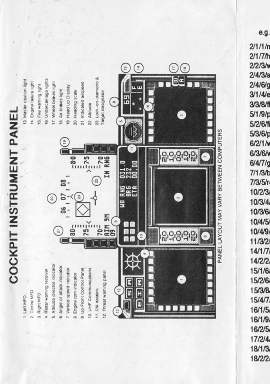

Page/paragraph/word/response

e.g. your response to: page 42 para. 1 word 2 would be: **pitch**

2/1/1/most	18/3/8/will	32/2/6/panel	40/3/3/straps
2/1/7/heart	18/5/3/will	32/3/3/below	40/3/6/look
2/2/3/worth	19/1/6/switch	32/3/7/when	40/3/9/clear
2/4/3/also	19/3/4/modes	33/1/4/left	40/4/2/locked
2/4/6/great	20/1/7/mode	33/2/2/engine	40/5/1/having
3/1/4/earn	20/2/8/radar	33/2/9/about	40/5/5/feet
3/3/8/flying	21/1/6/global	34/1/4/until	41/1/4/keep
5/1/9/pilot	21/2/2/mode	34/2/2/over	41/1/9/other
5/2/6/first	22/2/3/nose	34/2/7/will	41/2/9/degree
5/3/6/pilot	22/3/1/this	35/1/1/also	41/3/4/speeds
6/2/1/with	22/3/3/output	35/1/5/hand	41/3/7/rate
6/3/6/will	24/1/2/beam	36/1/1/your	41/4/4/turn
6/4/7/ground	24/1/6/line	36/1/6/round	41/4/7/need
7/1/3/begins	24/2/5/shows	36/1/8/from	41/5/6/your
7/3/5/record	24/3/2/second	36/2/3/your	41/6/5/will
10/2/3/icon	25/1/3/your	36/2/5/ahead	42/1/2/pitch
10/3/4/left	25/3/7/front	37/2/2/scale	42/1/9/then
10/3/6/corner	26/1/1/radar	37/2/5/hand	42/2/2/free
10/4/5/hand	26/2/7/front	37/3/2/scale	42/3/1/before
10/4/9/icon	26/3/4/scale	37/3/6/side	42/3/8/well
11/3/2/guys	27/1/3/right	38/1/2/bars	43/1/3/start
14/1/7/five	27/2/5/hand	38/2/3/centre	43/1/7/back
14/2/2/flight	27/3/2/will	38/3/4/left	43/2/1/your
15/1/6/assign	27/4/1/over	38/3/6/corner	43/2/3/begins
15/2/6/want	27/4/5/hand	38/4/4/given	45/2/1/your
15/3/8/will	27/4/8/will	38/5/3/figure	45/2/5/with
15/4/7/stroll	28/1/2/bear	38/6/2/below	45/3/8/faced
16/1/5/weapon	28/1/8/given	38/6/6/find	46/1/3/vital
16/1/9/stock	28/2/2/panel	38/7/5/will	46/1/5/you
16/2/5/stores	31/1/7/radar	40/1/6/free	46/3/2/will
17/2/4/your	31/3/1/your	40/2/6/flight	46/4/3/take
18/1/3/trend	32/1/1/alert	40/2/8/begin	46/4/5/during
18/2/2/major	32/1/4/light	40/3/1/check	46/5/1/know

47/1/5/join	56/6/4/power	67/3/5/either	80/1/2/your
47/1/8/pilots	56/7/2/depots	67/4/4/tanks	80/2/3/with
47/2/5/flying	56/7/4/fuel	67/5/4/fitted	80/2/7/inputs
49/1/1/target	57/1/6/their	67/6/1/chaff	81/1/8/your
49/2/1/your	57/2/5/these	67/7/1/flares	81/3/4/also
49/2/4/weapon	57/3/1/early	67/7/6/used	82/3/3/either
49/3/2/chosen	57/5/1/tank	68/1/1/after	83/1/1/stalls
49/3/4/weapon	57/7/3/during	68/1/8/where	83/4/4/angle
49/3/9/attack	59/2/1/both	68/2/4/relax	84/2/3/these
49/4/3/caught	59/3/4/armed	68/2/7/assess	84/3/6/jet
49/4/5/target	59/4/1/your	69/1/1/having	85/1/2/with
49/4/9/expect	59/4/3/will	69/1/4/little	85/1/6/this
49/5/3/happen	59/4/5/having	69/2/6/middle	85/2/6/force
51/1/1/flying	60/1/1/once	69/3/5/just	85/3/4/worth
51/1/6/will	60/2/3/case	70/1/3/combat	86/1/3/ground
51/1/9/enemy	60/2/7/your	70/2/4/very	86/2/3/form
52/2/1/your	60/2/9/will	70/2/9/used	86/3/1/there
52/2/3/crew	60/3/8/heat	71/1/4/from	86/3/4/weapon
52/3/3/ground	60/4/3/that	72/1/2/your	86/4/8/these
52/3/7/heat	60/4/9/range	73/1/3/find	87/1/2/rely
52/4/2/first	62/1/8/common	74/1/2/this	87/1/6/wear
53/1/1/much	62/2/3/your	74/1/6/extra	87/2/5/piece
53/1/5/this	64/1/3/type	74/1/8/during	87/3/5/back
53/4/2/have	64/4/4/most	75/1/6/your	87/4/7/apply
53/4/8/very	66/1/1/this	76/1/7/turn	87/5/3/worn
56/2/1/study	66/1/6/fitted	77/1/2/used	87/7/1/gloves
56/2/6/during	66/2/7/close	77/1/9/this	87/7/6/proof
56/3/3/range	66/4/5/port	78/1/5/half	87/8/2/last
56/3/5/minor	66/4/7/this	78/1/7/this	87/8/7/least
56/4/3/these	67/1/3/switch	79/1/5/prior	94/2/2/hold
56/5/4/spares	67/2/6/atars	79/2/4/above	94/3/7/speed