
Aerosoft English Electric Lightning F3

Volume **1**

CONTENTS

INTRODUCTION TO THE ENGLISH ELECTRIC LIGHTNING	2
WHAT IS IN THIS PACKAGE	2
WHERE ARE THEY NOW?	2
THE MANUALS	3
COPYRIGHTS	3
CREDITS.....	4
SYSTEM REQUIREMENTS	4
CONTACT SUPPORT	4
INSTALLATION AND REMOVAL	4
FSX SETTINGS.....	5
OPTIONS SETTINGS DISPLAY	5
AIRCRAFT REALISM SETTING.....	6
FSX TWEAKS.....	6
VIEW POINT	7
KEYBOARD ASSIGNMENTS.....	7
AUTOPILOT (AP).....	7
FLIGHT DIRECTOR (FD).....	8
IFF SYSTEM.....	8
TAXIING.....	8
IN-FLIGHT REFUELLING	8
ROTATION TAKE-OFF	8
NIGHT FLYING	9
COCKPIT LIGHTS.....	9
PROBE LIGHT.....	9
STOPWATCH	9
PANELS.....	9
USING THE SWITCHES AND KNOBS	10
STARTING THE ENGINES	13
THROTTLE BOX.....	13
RADAR.....	14
MODE SELECTOR.....	14
GROUND EQUIPMENT, REFUELLING AND REPACKING THE CHUTE.....	15
EXTERNAL POWER	15
LEAVING THE AICRAFT	15
WEAPONS	15
RED TOP/FIRESTREAK	16
MISSILE JETTISON	16
ARMING AND FIRING	16
30 MM ADEN CANNON.....	16
LFS (LIGHT FIGHTER SIGHT)	16
NAVIGATION	17
TACAN CHANNELS	17
RADIO	18

Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-2 21 May 2014
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INTRODUCTION TO THE ENGLISH ELECTRIC LIGHTNING

The last all British fighter jet it is one of the most impressive achievements in the history of aircraft design. First flown as the P.1A on the 4 August 1954 the Lightning F.1 entered Squadron service on the 29th December 1959. The updated F.3 superseding these aircraft from the 16th June 1962. A quintessential British fighter, it was short on fuel but with plenty of power to hand its performance put it into a different league to existing fighters, and an absolute delight to fly its performance was still unmatched twenty years after it entered service.

The Lightning was created by English Electric (later part of BAC) and it was typical of the Interceptor type of aircraft. It had two massive Rolls Royce Avon engines that were stacked in the fuselage and wings swept back an astonishing 60°. Its maximum speed and ceiling are till this moment not fully clear, but for sure it was comfortable at 66.000 feet and could reach 36.000 feet in three minutes. Try that in an A320. At 36.000 feet it could reach Mach 2 though many models never got over Mach 1.7. It also was the first aircraft to supercruise (meaning supersonic flight with operations cargo/weapons without using afterburners like the Concorde can do) and even now there are few aircraft capable of supercruise.

The Lightning represented the zenith of old style technology, digital was still many years in the future. In the Lightning the main "computer" was between the pilots ears, a situation that meant an extremely high cockpit workload., but nevertheless this aircraft was loved by all who were lucky enough to fly it. Despite its shortfalls in endurance and weaponry the Lightning was not retired from first-line duties until 1988.

When the Lightning was first brought into service, there were no two seater "T" Birds, so the Ab Initio pilots had only the pilots notes and their wits to sustain them, and this situation led to one wag reporting after his first flight: "I was with her all the way until I let the brakes off!" Without any integrated systems your workload is high and the flying characteristics are tricky. Landing speeds are high, visibility moderate. If you can handle the Lightning you will have few problems with any other aircraft. Keep your mind focused, stay ahead of the aircraft and she perform. Get behind and she bites.

This is the situation you will find yourself in. A set of Pilots Notes and Flight Reference Cards are included with this model of the F mk3, and this section will explain any items that are specific to the Flight simulator and are therefore not covered in the air publications. The Legend lives on!

WHAT IS IN THIS PACKAGE

You will find the Lightning F mk3 rendered in colors of seven of the Squadrons operating the mark covering the late 60's to early 80's. Also included in this package are Mk1A/2 with a further 2 color schemes. If selected the VC and flight performance remains that of the Mk3. Its inclusion is so that repainters can apply their talents to accurately produce color schemes of Squadrons that never flew Mk3's.

WHERE ARE THEY NOW?

Unfortunately none of the aircraft in this project is currently flying, here is where they are now.

- | | |
|--------------------------|------------------------------------------------------------|
| • XR 718 (5 and 56 sqn) | Private ownership (Dismantled) |
| • XP 701 (11 sqn) | Robertsbridge Aviation Society (Front fuselage) |
| • XP 705 (29 sqn) | Crashed Cyprus 7 / 8 / 1971 (Abandoned after engine fire) |
| • XR751 (74 sqn) | Jet Art Aviation (Front fuselage) |
| • XP762 (111 sqn) | Scrapped / Leconfield |

Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-3 21 May 2014
--------------------------	----------------------	----------	----------------------

- XR794 (LTF) Gateguard (Peterhead)
- XM171 (56 Firebirds) Scrapped / Leconfield
- XN728 (92 sqn) Roadside landmark on the A1 (now gone)

THE MANUALS

There are 3 separate documents that make up the manual. Do note that we speak of FSX only, but all will apply for P3D as well. As much as possible we used original documents, it is a sign of a serious add-on if you are able to use the actual real documents!

- **Vol 1 - In FSX.pdf:** You are reading it now. Contains information on using the aircraft in FSX and more general information.
- **Vol 2 – Cockpit Guide.pdf:** Contains 5 images describing every item in the cockpit. These are also part of the Pilot Notes but here they are shown larger.
- **Vol 3 – Pilot Notes:** The actual manual on the system and operations of the aircraft.

Also note that the readme.txt always contains the information on the latest updates. Before contacting support do make sure you installed the latest version!

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Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-4 21 May 2014
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CREDITS

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Project Management:	Mathijs Kok (Aerosoft), Dave Rowberry
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Flight Mechanics + Chute:	John Cagle
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Fuel Transfer Gauge:	Joshua Che
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Testing	Several good folks who will all be getting a copy

Special thanks to Lightning pilot John Ward for the use of cockpit (it's amazing) and the rest of the team at Bruntingthorp's Lightning Preservation Group for their valuable assistance, and Richard Scarborough for giving

SYSTEM REQUIREMENTS

- Intel Core 2 Duo E6850 CPU (Core 2 Quad recommended)
- 2 GB RAM (4 GB recommended)
- Direct X 9 compatible Graphics Card with minimal 512 MB (1 GB highly recommended)
- Microsoft FSX (SP2, Gold or Acceleration) or Lockheed Martin Prepar3D V2.2 or higher
- Windows XP, Windows VISTA, Windows 7, Windows 8 (fully updated), 64 bit versions recommended

CONTACT SUPPORT

Support for this product is done by Aerosoft. We prefer to do support on the support forum for one simple reason, it is fast and efficient because customers help customers when we are sleeping.

- F-14 X FAQ (please check this first): <https://aerosoft.zendesk.com/forums/23054618-Electric-Lightning>
- F-14 X forums: <http://forum.aerosoft.com/index.php?/forum/663-electric-lightning/>
- If you prefer support by email (and can afford to wait a bit longer):
https://aerosoft.zendesk.com/anonymous_requests/new

We feel strongly about support. Buying one of our products gives you the right to waste our time with questions you feel might be silly. They are not.

INSTALLATION AND REMOVAL

Installation is simple-- start the .exe file you downloaded and follow the instructions on screen. Make sure FSX (P3D) is closed and we do advise you to reboot your system before installing. After installing it can help to defragment your hard disk (unless it is a SSD drive that should not be defragmented)

Removal should **never** be done manually but only using the software removal applet you will find in the Windows Control panel.

FSX SETTINGS

There are a few settings that influence this aircraft.

OPTIONS | SETTINGS | DISPLAY

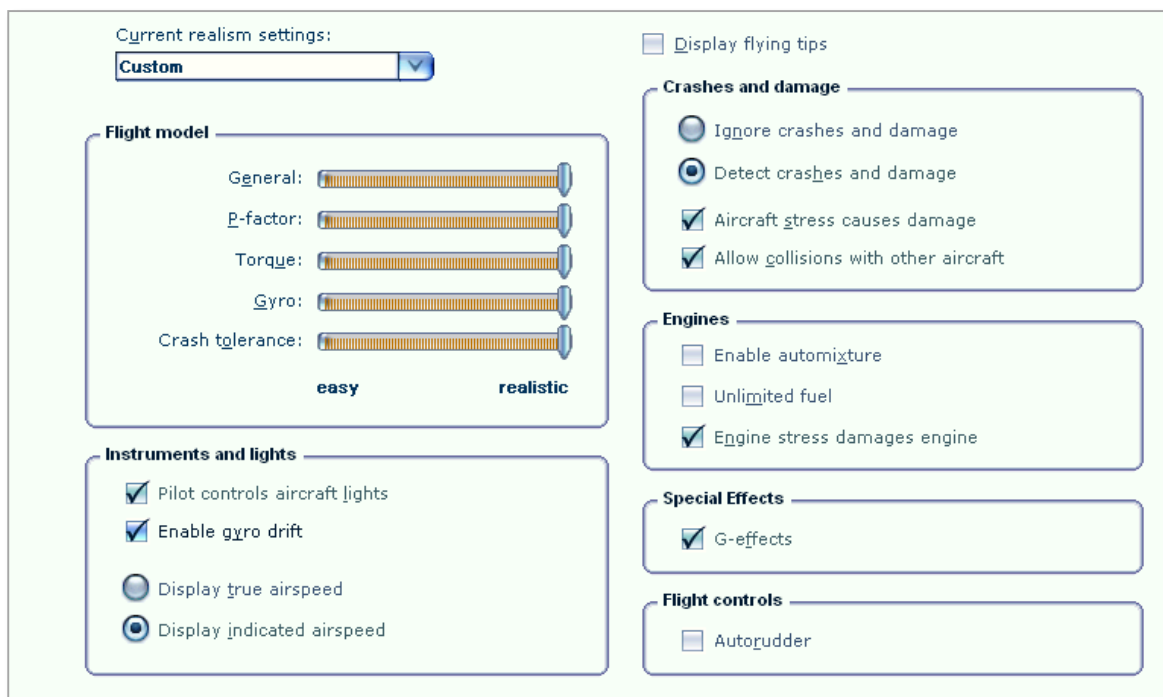


- **Advanced animations** needs to be ON
- To avoid problems we advise you to keep **Preview DirectX 10** OFF



- **Aircraft cast shadows on the ground** can be left ON as it will hardly affect frame rate.
- **Aircraft cast shadows on itself** can be ON when you got a fast machine, but it will hurt frame rate in external views.

AIRCRAFT | REALISM SETTING



The most important settings are in the Aircraft settings: realism dialog.

- **Flight model:** Set it to full realistic. Believe us; it will fly easier that way.
- **Instrument and lights:** You do want to control the lights and the gyro drift is not hard to handle (in fact you can ignore it). Of course we want indicated airspeed, true airspeed is totally useless.
- **Crashes and damage:** Not too important. You might gain a bit of FPS setting this all **OFF**.
- **Engines:** Set as shown, but it does not really matter.
- **Special effects:** These can be set to **ON** initially, but you might find the black-out limit is a little low for a season fighter pilot. Recommended **ON** if TacPack is installed (fixes the low Black-out limit).
- **Flight Controls:** To prevent FSX from messing things up best keep this **OFF**.

FSX TWEAKS

We are not big fans of any modification to FSX, a good deal of our support is caused by these changes. There is one tweak however that is almost obligatory these days and that is the HighMemFix trick. This change to the fsx.cfg file allows FSX to better handle texture addressing modes when using high levels of video memory. It also helps a lot when memory is scarce and for products like the Airbus X A320/A321 (formally known as the Airbus X Extended) it is almost obligatory. There are no negative effects reported. In our opinion, the HighMemFix line should be added to everyone's fsx.cfg file.

HighMemFix must be added manually to the fsx.cfg file as shown below:

[GRAPHICS]

HIGHMEMFIX=1

Note this tweak is not needed for P3D.

VIEW POINT

Some of the switches and controls are hidden by the seat or other items. If you do not have a head tracker you will have to get used to using the keypad to change the location of the view point. These are the standard FSX commands for that:

Alternatively dedicated views are accessible on keying [A].

Event	Keyboard
2-D Cockpit View (shortcut)	F10
Aircraft labels (display/hide)	Ctrl + Shift + L
Axis indicator (cycle)	
Chase distance (decrease)	Ctrl + -
Chase distance (increase)	Ctrl + =
Coordinates/frame rate (cycle)	Shift + Z
Eyepoint (move back)	
Eyepoint (move down)	Shift + Backspace
Eyepoint (move forward)	Ctrl + Backspace
Eyepoint (move left)	Ctrl + Shift + Backspace

KEYBOARD ASSIGNMENTS

All the standard FSX keys will work, but we advise you to assign two more keys. In this example we used the [CTR]-[SHIFT]-[C] and [CTR]-[SHIFT]-[V] for this.

Event	Keyboard
Cabin alert - No Smoking (on/off)	Ctrl + Shift + C
Cabin alert - Seatbelts (on/off)	Ctrl + Shift + V
Capture Screenshot	V

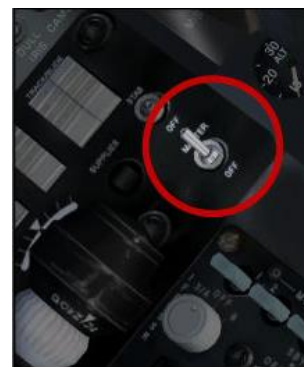
- Brake chute can be deployed if assigned to the CABIN SEATBELTS ALERT SWITCH
- Brake chute can be released if assigned to the CABIN NO SMOKING ALERT SWITCH

AUTOPILOT (AP)

The Autopilot in the Lightning is a capable system that is capable of maintaining heading and altitude, used with the TACAN it even allows fully automated landings. To use the autopilot:

- FD/AP switch on stick set to OFF
- Autopilot master switch ON
- FD/AP switch on stick select AP
- Select functions as required
- Pull back will cancel autopilot

Auto throttle is only available below 275 knots and will try maintain 183 knots, so do not forget to disconnect as airfield threshold is crossed!



FLIGHT DIRECTOR (FD)

When the Lightning would be intercepting targets it would be assisted by ground controllers. They could control the Flight Director 'bead' and the pilot would just have to keep that centered on the attitude display.

As FSX does not allow that functionality the bead is now controlled only by the Autopilot.



IFF SYSTEM

As the IFF (Identification Friend or Foe) has no function in FSX the IFF in the Lightning is used only as the transponder. Only the highlighted part of the system is used.



TAXIING

The Lightning has a differential braking system so to steer first get the aircraft rolling (slowly!) then apply rudder in the direction required and apply the brakes (use a repeated dabbing action rather than constant pressure). As the rudder does not gain full authority until 100kts be prepared to use the brakes on a crosswind take-off / landing.

IN-FLIGHT REFUELLING

The Lightning has big and thirsty engines and range always was a problem. So in-flight refueling was the norm when the aircraft flew operational. We have included a simple but effective way to extend the range of the aircraft. If the aircraft is between 10,000 and 35,000 feet and 250 to 300 knots in-flight refueling can take place (obviously it is preferable if you are in position on a tanker but it is not compulsory).

Note: Fuel flow rate is accurately represented so depending on the fuel state this could take several minutes and the Mk1A and Mk2 have no probe fitted so it cannot do air to air to air refueling.

ROTATION TAKE-OFF

Being designed to intercept bombers the Lightning needed to have very good climb performance. This was later used to great effect during aerial display flights. This is the classic Lightning display take-off:

- Full reheat, lift off at 160 kts and raise the undercarriage (pre-select on runway!).
- Level out at 10 ft (!) and continue to accelerate to 260 + kts.
- Pull the stick fully back (3.5G) and then recentralize again when a 60 degree climb is established.

Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-9 21 May 2014
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- Roll off the top at desired height and cancel reheat.

Maintaining the 60 degree climb angle is not easy visually, so use the attitude indicator.



NIGHT FLYING

While flying at night was certainly not without challenges in the early 60's, the Lightning was expected to operate in all light conditions.

COCKPIT LIGHTS

The main panel lighting zones are controlled by the five dimmer switches on the right console. In addition there is a bright/dim floodlight switch adjacent to the standby ASI and an emergency lighting switch on the FR panel. These are not intended to be used in conjunction as the effects are cumulative and will result in over brightness.

PROBE LIGHT

Nav lights must be selected ON for the probe light to work.

STOPWATCH

Main button starts and stops the watch. Reset to 0 with side button.



PANELS

All the basic information you need to fly the Lightning is on the Flight Reference cards.

- Aircraft state Shift+2
- Flight reference cards(norml) Shift+3
- Flight reference cards(emergency) Shift+4
- Nav frequency card Shift+5

USING THE SWITCHES AND KNOBS

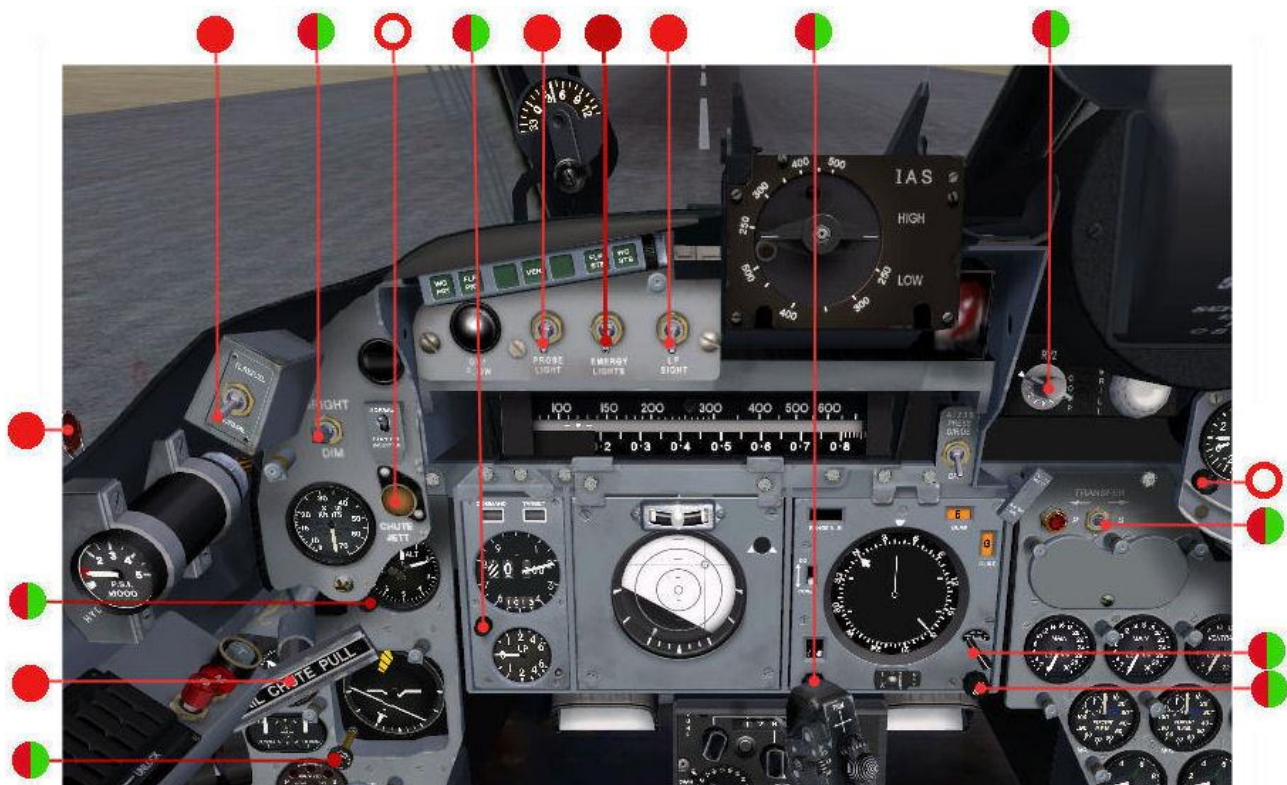
As there are many switches that have more than one setting (something that is not common in modern aircraft) we decided to use the same method for all controls. You can either left click for one direction or right click for the other direction or use the mouse wheel. Using the mouse wheel for all controls is far more natural, just put the cursor on the control and wheel up or down. Imagine the mouse wheel to be the switch and it all will seem very natural. This will work for rotary controls and switches. A tool tip will almost always give you the detailed setting.

- Left click or Wheel Up = On / Increase / Shift Left / Shift Up
- Right Click or Wheel Down = Off / Decrease / Shift Right / Shift Down

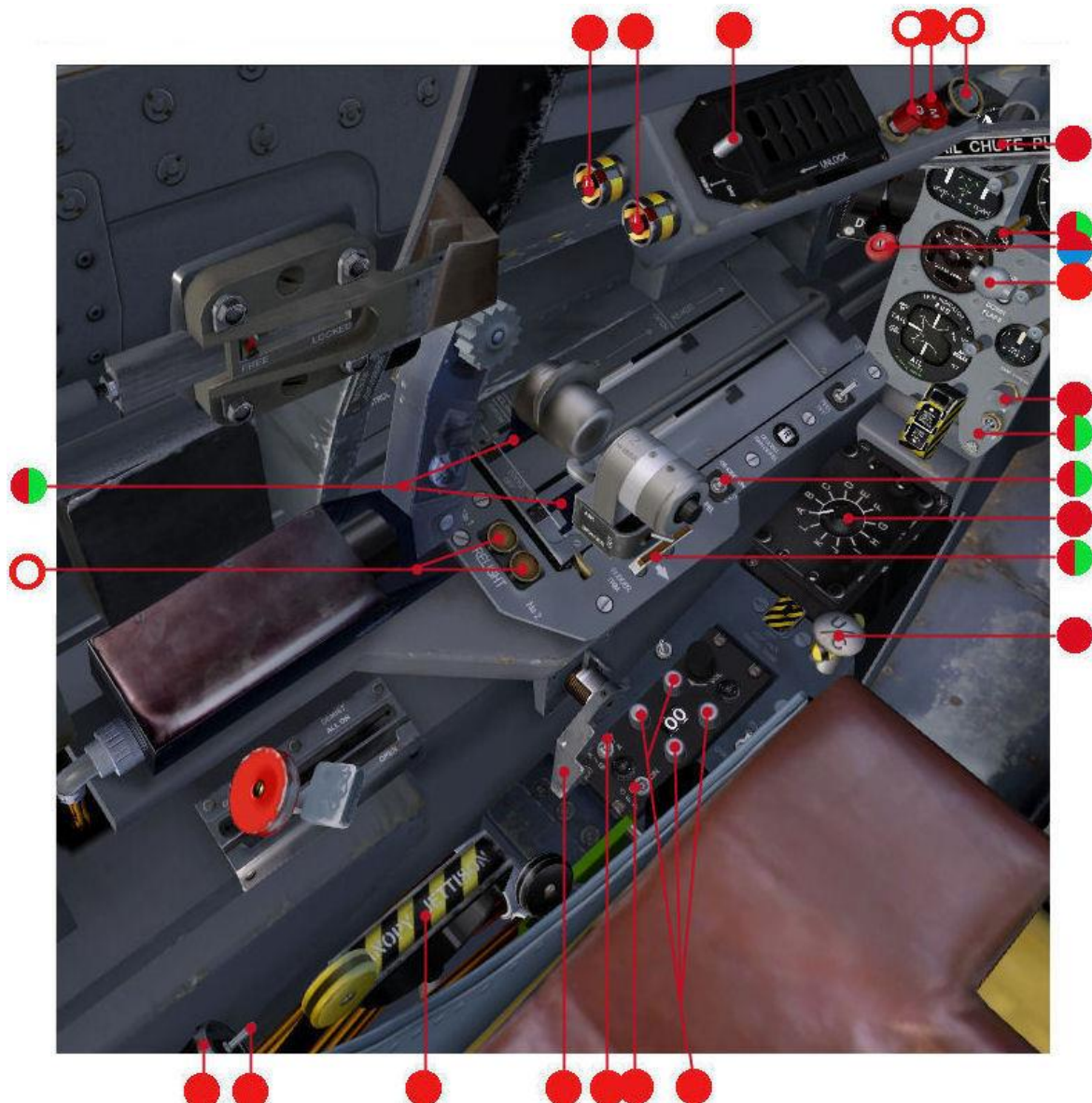
Which control will accept what input can be seen on the following diagrams.

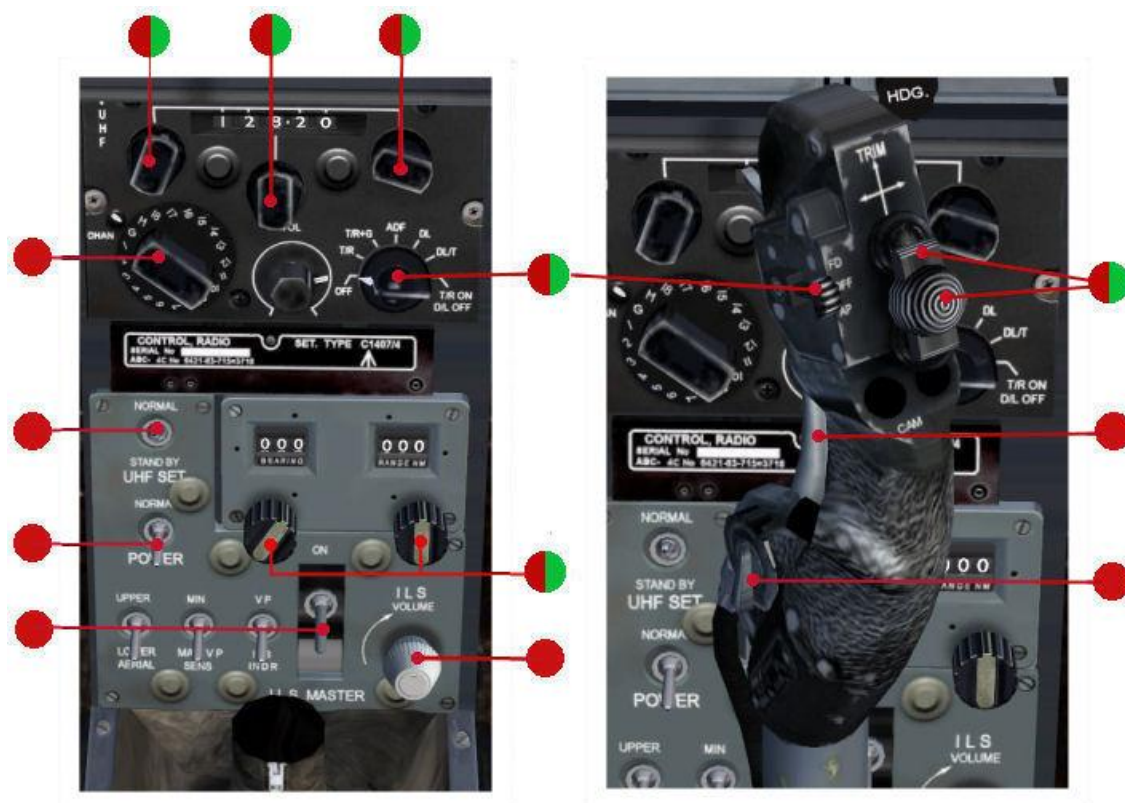
Key

- = left click on/off
- = left and right clicking
- = left click and release
- = left click and drag up/down









STARTING THE ENGINES

[SHIFT] - [2] opens a dialog screen that gives the choice of the aircraft parked ready for the pilot to climb the ladder, or with all switches set and ready to press the start buttons. If the former is chosen [SHIFT] - [3] then displays the Flight Reference Cards which can be followed for the starting procedure.

If during a flight an emergency occurs [SHIFT] - [4] displays the Emergency Procedures. If the engines are to be started with [CTRL] - [E] and flown externally it is still advised to pre-set the cockpit switches with Shift+2 and "All On" or the engines may fail as the ventral tank becomes empty.

Note: The Avon is not a fan jet. The visible blades are intake guide vanes and do not rotate, nor does the central dome which is a fairing for the starter. The rotating compressor is therefore not visible.

THROTTLE BOX

The HP fuel cocks are incorporated as the first portion of movement of the throttles. Use the mouse to click on the stem rather than the throttle handle to open/shut the cock.



Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-14 21 May 2014
--------------------------	----------------------	----------	-----------------------

A real throttle box has a mechanical stop on the no2 throttle to give a “fast idle” that keeps the generators on line in the descent. As some users will have only a single throttle set-up the act of throttling back will mean the “clangers” will be continually sounding as the generators drop of line , so to prevent this happening the “AC ” reset button can be utilized to override this by keeping the generators “on line”.

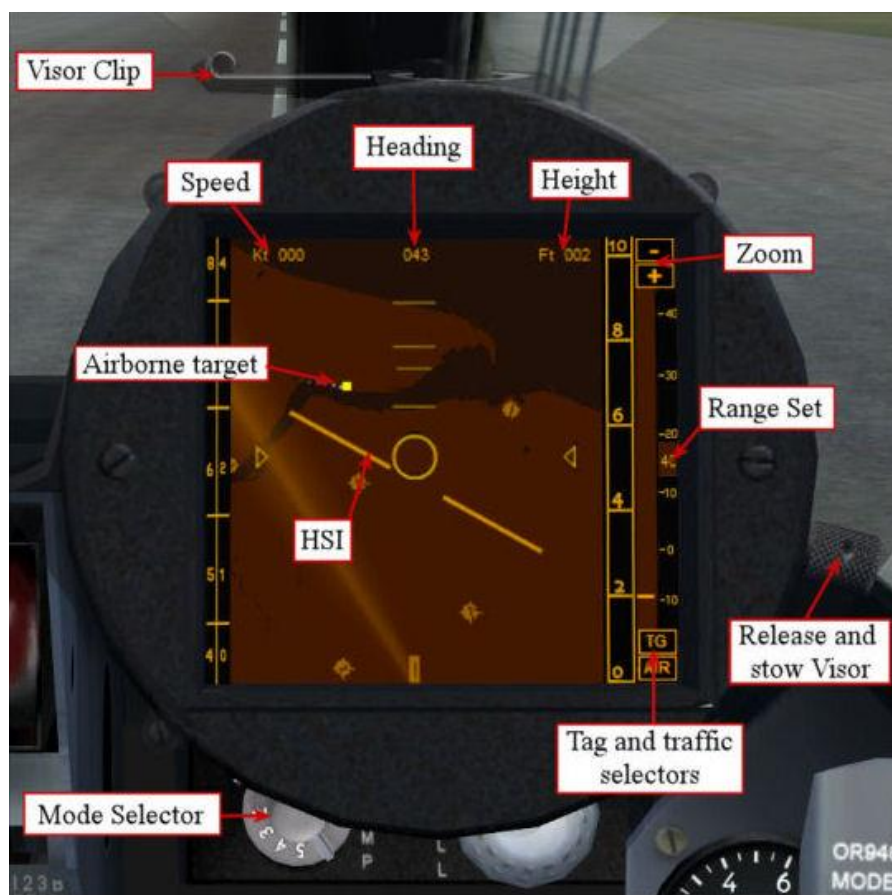


RADAR

The Lightning radar in real life is a CRT “B” scope device operated by the Hand Controller on the port side of the cockpit. To reproduce this in FSX would be impractical, so a more “user friendly” solution has been employed , and simulates the device in “look-down” mode .

The screen is normally hidden by the folded visor that is use to stop sun glare. To undo or refold operate the clip on the top. For night operations the pilot can remove and stow the cover by operating the release clip on the right hand side. In operation

the ground is a better reflector so shows as a brighter return enabling coastlines to be made out. If airborne traffic is encountered the direction of flight is indicated by its tail, whereas type and altitude can be called up with the “TG” selector.



MODE SELECTOR

The mode selector is used to select what should be shown on the radar.

- 0 = Off
- 1 = Land and coastlines
- 2 = 1 + Aircraft
- 3 = 2 + Runways

Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-15 21 May 2014
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- 4 = 3 + ILS headings
- 5 = 4 + Airfield ID

Note: If the sun reflects on the screen making it hard to see, clicking the “Brill” knob will change the screens angle which may help.

GROUND EQUIPMENT, REFUELLING AND REPACKING THE CHUTE

After a flight Shift+2 and selecting “All off” will trigger:

- Display the ground equipment
- Refuel the aircraft
- Refit the chute
- Replace the canopy (if lost)

To trigger some of the other animations:

- Opening the canopy and applying parking brake attaches the ladder
- Power set leads and fire-bottle will disappear on No2 engine acceleration
- Chocks will disappear if parking brake off
- Power set disappears as aircraft starts to move
- Reload the aircraft to re-arm

EXTERNAL POWER

The external power set (or Houchin) can be started and power applied by pressing the telebrief button or if the canopy is not in the way, on the Houchin body. This will provide electricity to the aircraft and will prevent the battery running out.



LEAVING THE AIRCRAFT

If everything goes pear-shaped clicking the seat or the face blind handles will make you and the aircraft part ways in a dramatic fashion.

WEAPONS

The Lightning was armed with a twin 30mm ADEN canon and 2 De Havilland Firestreak or 2 Hawker Siddeley Red Top missiles most of the time though other weapons could be fitted. The Firestreak was a first heat seeking missile that had a limited ability to detect its target (it would only track the exhaust of the engine). The Red Top was an improved version capable of all-aspect detection of supersonic targets..

Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-16 21 May 2014
--------------------------	----------------------	----------	-----------------------

RED TOP/FIRESTREAK

Redtop is the default missile for the F3 but Firestreaks can be selected if desired using the Shift+2 display. The F1 and F2 were only armed with Firestreak missiles.

MISSILE JETTISON

If the aircraft is to be flown without missiles resetting the safety-cover on the jettison button will fit covers to the pylon stubs

ARMING AND FIRING

Please note that until a TacPack addition is released no visual effects are available!

1. Select GW on master arming switch and the ARMING light will be lit, followed 2 minutes later by the ARMED light. In this period the sensor head is cooled to -180 Celsius.
2. Putting Safe / Armed switch to Armed will display Event1 and Event2 lights.
3. Select Pairs or Singles and Pull trigger
4. After 1 second delay the right missile will launch (if PAIR is selected the left missile will launch half a second later). Note that the Engine Igniters will be activated on launch as the missile exhaust could cause the engine(s) to flame out.

30 MM ADEN CANNON

Please note that until a TacPack addition is released no visual effects are available!

The Royal Small Arms ADEN 30 mm cannon was a popular weapon on aircraft as it is reliable and had a good rate of fire and an increased lethality compared to the cannon of a generation before. It is based on the principle of a revolver where the cylinder with multiple chambers revolves in front of a single barrel.

Selecting "Guns" will uncover / blank the gun-ports.

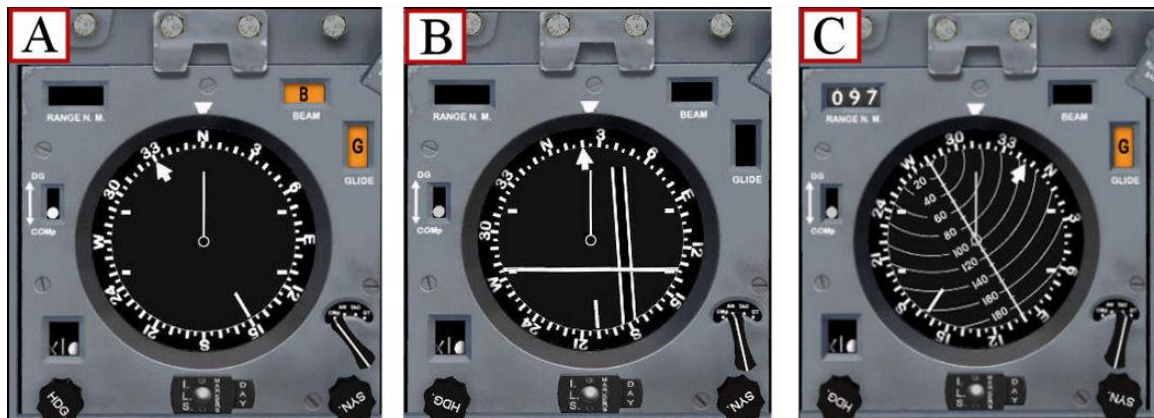
LFS (LIGHT FIGHTER SIGHT)

The LFS is a gun sight that is normally stowed on top of the coaming. It can be raised to aid in aiming the cannon.

- Raise or lower by clicking on the reflector glass.
- Select Master Arm ON , and LF Sight ON to display aiming marks

NAVIGATION

Navigation in the Lightning is rather basic compared to modern aircraft. Of course GPS is not available!



A: **Compass mode:** Heading pointer set with "HDG" Knob.

B: **ILS mode:** In the illustration aircraft is heading 025 and is above and to the left of the runway 021. Set runway bearing with "SYN" knob. Morse identification transmissions can be muted by the ILS volume control.

C: **TACAN mode:** The beacon is 97 miles distant on a bearing of 280 (A/G set). If A/A selected only distance reading available so display slowly spins.

TACAN CHANNELS

Tacan is the military version of VOR. The only difference you will note is it uses only three digits as opposed to the normal 5. A conversion chart is available with Shift+5. Frequencies selected by the four push buttons. Select A/G for navigating to ground based beacons, A/A for airborne beacons.

The Lightning managed with only the "X" channel (in VOR channels ending in decimal 00). But as some users will no doubt want to use their home airfields a "Y" channel (VOR decimal 05) is available by selecting channel "B" on the ILS control box.

The digits on the TACAN Offset computer can be set but do not provide data to the TACAN system.



Aerosoft Lightning F3	The Lightning In FSX	Vol 1	1-1-18 21 May 2014
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RADIO

The UHF radio frequencies are selected by the two outer knobs. Because of a bug the decimals may read incorrectly at some settings.(What should display as a 3 will sometimes show as a 2 and 8 as 7 for the last decimal) . The tooltips will however show the correct frequency. The center knob will alter its drum but not the frequency. Switch between active (displayed) frequency and standby by selecting "G " (guard) on the multi switch.

To enable better access to the radio switches the "Fast Errect" has been utilized to hide/reveal the control column.

