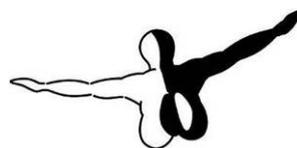




AEROSOFT

A-10 Warthog

A tank commanders' nightmare



aeroSOFT^{GMBH}



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If you are not the type that reads manuals for fun, or if you would just like to get this bird airborne to check it out, use the Scramble Checklists near the end of the manual. This will get you in the air very fast.



Introduction

Here in the office we like FS2004 for many reasons, one is because it is such a perfect tool for simulating civil aviation, another is that it let's you do things you would never get to do in real life. One of these things is to fly a big aircraft, very low, very loud, shooting up everything you see. Sure, it is not the high school of simulation, but it sure is a bucket of fun. If you get to do that in a very high end aircraft, well, that only makes it better.

Make no mistake, the A-10 Warthog is a high end simulated aircraft, but that does not mean you can't have fun. This aircraft is BUILT to be flown low, loud and dangerous. We'll provide the aircraft, you provide the targets.

Mathijs Kok
AEROSOFT ConDev

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With special thanks to the team of people that supported us in the beta. They are cool folks. Very special thanks go out to Dag, what he done goes way beyond the call of duty. Way beyond as he is in fact the designer of some of the liveries you see.

System requirements

- Pentium 1.6 GHz
- 512 Mb RAM
- 400 Mb of free available SPACE on the hard disk
- Sound card
- Microsoft Flight Simulator 2004 (NOT compatible with older versions)
- Windows 98, Windows 98 SE, Windows ME, Windows 2000, Windows XP, Windows 2003
- Adobe Acrobat® Reader 5 minimal to read and print the manual ⁽¹⁾

⁽¹⁾ Available for free, download at:

<http://www.adobe.com/prodindex/acrobat/readstep.html>

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 and because customers help customers when we are sleeping.

Aerosoft forums: <http://forum.aerosoft-shop.com/forum/index.php>

We feel strong 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.



The aircraft and its history

Perhaps the most interesting aspect about the A-10 is that it is an aircraft that has been scheduled to be removed from active service three times. Every time a real shooting war showed that the A-10 is just so perfect, that removing it from the USAF would mean a gaping hole that no other aircraft can fill. If you need to have tanks killed or any other smallish target removed from the equation, the A-10 is there to do the job.

It is not beautiful like the Falcon, nor sophisticated like the Stealth Fighter or as impressive as the Tornado. The design is totally functional; we'll explain some of the features later.

The aircraft was designed in the late seventies when the aircraft of the day became faster, bigger, more fragile and more expensive. An F-16 can be shot down with a pistol if the guy in the ground is very lucky. There are huge parts of a modern fighter that have vital parts behind a very thin sheet of aluminum. To have these aircraft get very close to the ground (and the enemy pistols) was just becoming too dangerous. In fact, in Vietnam it was shown that old WW2 fighters that flew slower and were more rugged did a better job. The official name of the A-10, Thunderbolt II reflects its ancestor, the Republic P-47 Thunderbolt. This aircraft was legendary in its ability to get totally shot up and still do its task and get the pilot home. Well The A-10 does the same; it just delivers a lot more explosives and depleted uranium on the target. In case you wonder, although the aircraft is officially called Thunderbolt II, most pilots refer to it as the Warthog, or Hog in short. Clearly the rugged, dare we say ugly, looks of the aircraft reminded people of that animal.

Think back on the Cold War and imagine the NATO commanders fearing the huge numbers of Soviet tanks rolling west over the German fields. They needed an aircraft that could kill these tanks fast, reliably and economically. While Anti tank missiles were being perfected, they were (and are) very expensive and the aircrafts could just load a few. A single strike aircraft could expect to attack only a few tanks in a sortie. The A-10 is well known to kill up to 15 targets in a single flight. Using the gun as it should be used only a dozen shells will stop any vehicle. The bombs and other weapons can be used for other targets. Of course, in the last two decades the helicopter has been promoted a lot as tank killer or in the use of Close Air Support. But a helicopter needs to be stealthy because of the fact it is fragile. The A-10 is not stealthy, in fact, striking fear into the enemy is very much part of its tactic. The second Gulf War showed how effective that was. Few Iraqi tank crews were killed because most decided to leave their vehicles when A-10 were sighted. Eyewitness reports from Iraqi soldiers showed that they considered their tanks and vehicles deathtraps when an A-10 was around. They stayed away from their vehicles as much as possible. That's a complete new form of battlefield interdiction.

Close Air Support is the most dangerous mission a pilot can do. It requires you to get very close to the enemy to deliver your weapons. So the A-10 is built to survive. From the titanium bathtub that protects the pilot, to the armor plating that is in part 40 mm thick, this is a flying tank. Look at the way the engines are mounted, as far away from each other and the fuselage as possible. If one gets hit by a heat seeker, chances are very good the other engine will be fine. It also keeps the wings free for bombs and it is very easy to replace the engine.

There is one other thing that is vital for a CAS aircraft. It needs to be simple. Simple to use, simple to service. The A-10 can be made ready for a new mission in half an hour. Inside the cockpit is a mix of simple rugged gauges and simple controls.



Because the A-10 is basically made from other aircraft bits you will recognize sections of the panel if you've flown other aircraft like the F-5. In very simple terms, the A-10 is a simple, cheap, rugged aircraft, totally unlike the trend of aircraft design of the last quarter of the last century.

So why is it still in service? Well, that is because of two Gulf Wars. Before the first Gulf war there were plans to retire the A-10, but the moment the shooting started the A-10 started to fly missions and it became clear in days that the A-10 was the ideal aircraft for this war. With thousands of Iraqi vehicles dug in, it would have been impractical to advance fast and remove them. Sure Mavericks and smart bombs killed them, but not fast enough and not cheap enough. The A-10's could and they did. Soon almost any available A-10 was in theater, shooting up tanks.

Of course, humans being what they are, these lessons were soon forgotten and the A-10 was again scheduled to be replaced. The second Gulf War would be the war of smart ammunition and stealth. But the US soon learned that smart bombs are not nearly as smart as a Hog pilot with a nasty gun. Using a new strategy where aircraft are sent to the front without fixed targets and called in by on the spot commanders, the A-10 became even more effective. The 20 year old aircraft became the champion of the air. Without enemy fighters to worry about, they could loiter, waiting for a scout team to report a contact. The ground commander would then make contact with the enemy, call in the hogs that would remove the heavy guns of the enemy.

At this moment the future of the A-10 is uncertain, as it always will be. Again the voices that think the A-10 is too old, too tired and too out of date are getting stronger. But slight modernizations are being done and the aircraft is immensely popular by young pilots joining the Air Force.

It might not be glamorous, fast, stealthy or powerful, but any tank commander knows that his machine is no match for a hog that comes low over the battlefield with it's gun blazing.

Shiny or non shiny

One of the most innovative features of recent FS versions is the fact surfaces can be made reflective. This greatly enhances the 3D look of a model and on an airliner it is simply indispensable. On a military aircraft however it is controversial. They are not shiny but matted. But it also makes the model look flat and lacking detail. In short, it is a choice between good looks and good realism. So we asked a group of customers and of course they liked the shiny more. But on the product page you will find a link to the files containing the non shiny models if you prefer those.



Specifications

Design Features:

Cantilever low-wing monoplane, with wide chord, deep aerofoil section (NACA 6716 on centre-section and at start of outer panel, NACA 6713 at tip) to provide low wing loading. Incidence -1 degrees. Dihedral 7 degrees on outer panels.

Flying Controls:

Wide span ailerons made up of dual upper and lower surfaces that separate to serve as airbrakes. Flaps, airbrakes and ailerons actuated hydraulically. Ailerons pilot-controlled by servo tab during manual reversion. Small leading-edge slat inboard of each main wheel fairing. Redundant and armor-protected flight control system. Interchangeable elevators, each with an electrically operated trim tab. Rudders and elevators actuated hydraulically. Redundant and armor-protected flight control system.

Structure:

Aluminum alloy three-spar structure, consisting of one-piece constant-chord centre-section and tapered outer panels with integrally stiffened skins and drooped (cambered) wingtips. Outer panel leading-edges and core of trailing-edges are of honeycomb sandwich.

Landing Gear:

Menasco retractable tricycle type with single wheel on each unit. All units retract forward, and have provision for emergency gravity extension. Interchangeable main wheel units retract into non-structural pod fairings attached to the lower surface of the wings.

Power Plant:

Two General Electric TF34-GE-100 high bypass ratio turbofan engines, each rated at 40.3 kN (9065 lb st), enclosed in separate pods, each pylon-mounted to the upper rear fuselage at a point approximately midway between the wing trailing-edges and the tailplane leading-edges.

Fuel is contained in two tear-resistant and self-sealing cells in the fuselage, and two smaller, adjacent integral cells in the wing centre-section.

Maximum internal fuel capacity 4853 kg (10,700 lb).

Accommodation:

Single-seat enclosed cockpit well forward of wings, with large transparent bubble canopy to provide all-round vision. Bulletproof windscreen. Canopy is hinged at rear and opens upward. Douglas ejection seat operable at speeds of 450 knots (834 km/h; 518 mph) down to zero speed at zero height. Entire cockpit structure is protected by an armored 'bathtub' structure of titanium, capable of withstanding projectiles up to 23 mm caliber.



Dimensions

- Wingspan: 17.53 m (57 ft 6 in)
- Wing chord:
 - at root: 3.04 m (9 ft 11 1/2 in)
 - mean: 2.73 m (8 ft 11 1/3 in)
 - at tip: 1.99 m (6 ft 6 2/5 in)
- Wing aspect ratio: 6.54
- Length overall: 16.26 m (53 ft 4 in)
- wheel track 17 ft 2.5 in (5.25 m)
- Height overall: 4.47 m (14 ft 8 in)
- Tailplane span: 5.74 m (18 ft 10 in)

Weights

- Manufacturer's empty weight: 9183 kg (20,246 lb)
- Basic equipped weight, 'clean': 10,600 kg (23,370 lb)
- Operating weight empty: 10,710 kg (23,611 lb)
- Basic design weight, equipped: 13925 kg (30,700 lb)
- Max T.O. weight: 500 kg (47,400 lb)
- Thrust/weight ratio 0.6

Performance (At Max T.O. Weight Except Where Indicated)

- Never exceed speed: 450 knots (834 km/h; 518 mph)
- Max combat speed at S/L, 'clean': 390 knots (722 km/h; 449 mph)
- Combat speed at 1525 m (5000 ft) with six Mk 82 bombs: 385 knots (713 km/h; 443 mph)
- Cruising speed at S/L: 300 knots (555 km/h; 345 mph)
- Cruising speed at 1525 (5000 ft): 342 knots (634 km/h; 394 mph)
- Stabilized 45 degrees dive speed below 2440 m (8000 ft),
- AUW of 15,932 kg (35,125 lb): 260 knots (481 km/h; 299 mph)
- Max rate of climb at S/L at basic design weight: 1828 m (6000 ft)/min
- T.O. distance: at max T.O. weight: 1372 m (4500 ft)
- at forward airstrip weight: 426 m (1400 ft)
- Landing distance: at max T.O. weight: 762 m (2500 ft)
- at forward airstrip weight: 382 m (1250 ft)
- Operational radius: close air support and escort, 2 h loiter, 20 min reserves: 250 nm (463 km; 288 miles)
- reconnaissance: 400 nm (740 km; 460 miles) deep strike: 540 nm (1000 km; 620 miles)

Powerplant

Two General Electric TF34-GE100 each rated at 9,065 lb st (40.32 kN)



CONSOLE LAYOUT

Simulating a military aircraft in FS is at best a difficult task. Many of the functions are just not possible to simulate, from TACAN navigation to most of the weapons systems, it is just not available. Where possible we've included functions we considered logical and sometimes useful, but in many other cases the panels and switches are just not used, in this manual they are just ignored.

Main Panel

[SHIFT] – [1]

This is the default view, showing all main instruments. You will notice that the A-10 is not an aircraft that has brilliant visibility.

HUD

[SHIFT] – [2]

The Head Up Display is a subset of the main panel, but it can be switched off separately. This allows you fly with HUD only allowing you full visibility while still having all the basic information you need.

Instrument Panel

[SHIFT] – [3]

Looking slightly down we now see the complete instrument panel with all main flight instruments.

Right Forward Console

[SHIFT] – [4]

Looking to the right front we see the Right Forward Console. The most important panels there are Electrical, Oxygen and the main Warning lights.

Left Forward Console

[SHIFT] – [5]

Looking to the left front we see the Left Forward Console. Apart from the fuel, throttle and AP panels we see your left hand on the throttle. The throttle is not animated here because it is just not possible to animate the dual throttle correctly.

Right Aft Console

[SHIFT] – [6]

Under your right elbow is the Right Aft Console. Partly duplicated from the Right Forward Console, you will find the lights here. Not much else is operational in FS2004 here.

Left Aft Console

[SHIFT] – [7]

Under your left elbow is the Left Aft Console. Partly duplicating the Left Forward Console, you will find most of the radio's here.



PANEL NAVIGATION

Switching the panel is easiest done using the Switch Panel that is visible on panel. Just click on the panel you like to see. Any panel you are currently looking at will close and a new panel will open. When you have a slow computer it can help to run over all panels before each flight so the graphics are cached.



Main panel



Left Forwards Console



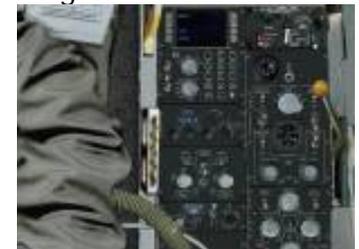
Instrument View



Right Forward Console



Left aft Console



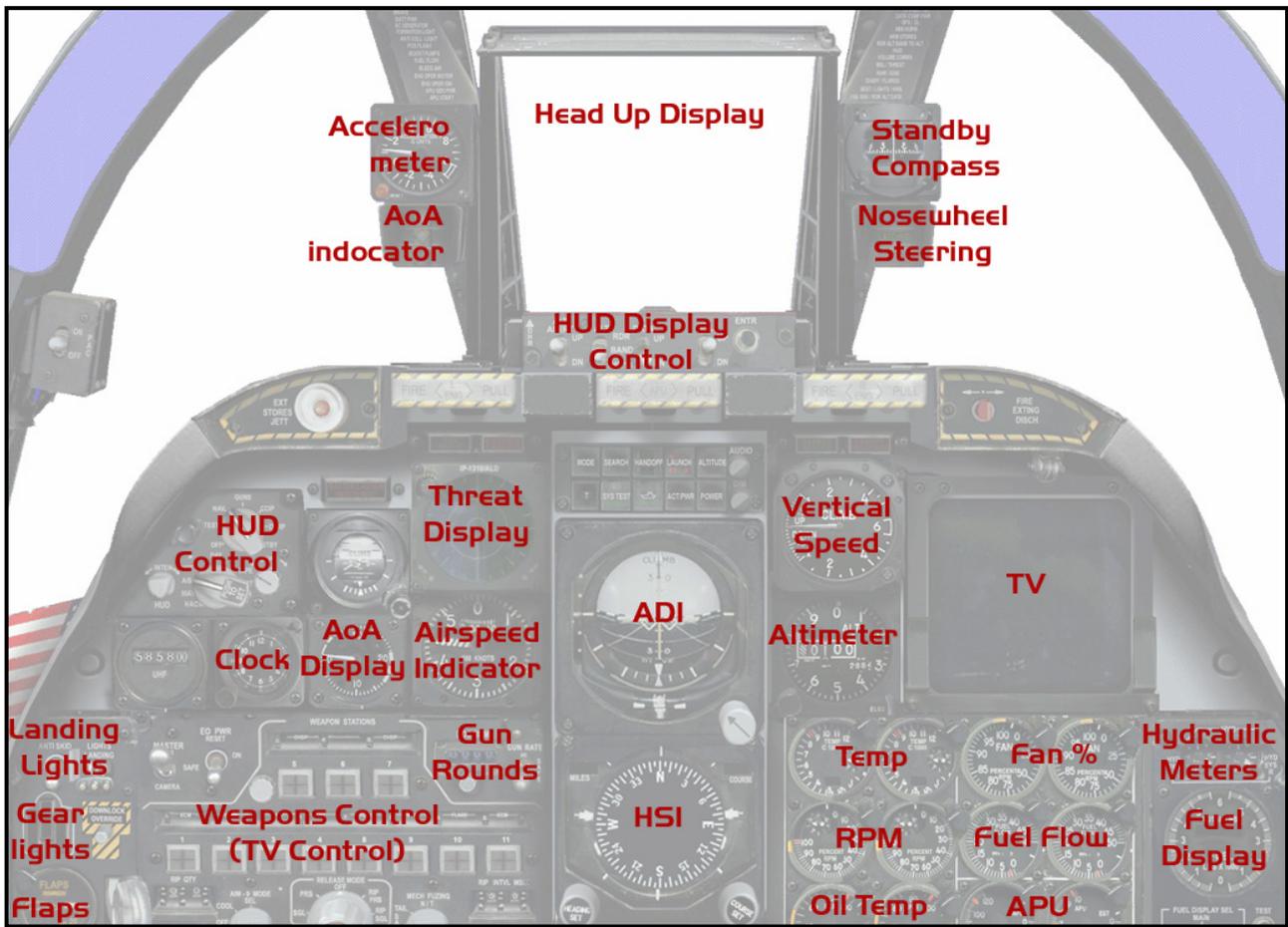
Right Aft Console

Technical note, the cockpit graphics are in 1600x1200 so at that resolution the cockpit graphics look best. Depending on your graphics card the scaled down version will degrade slightly.



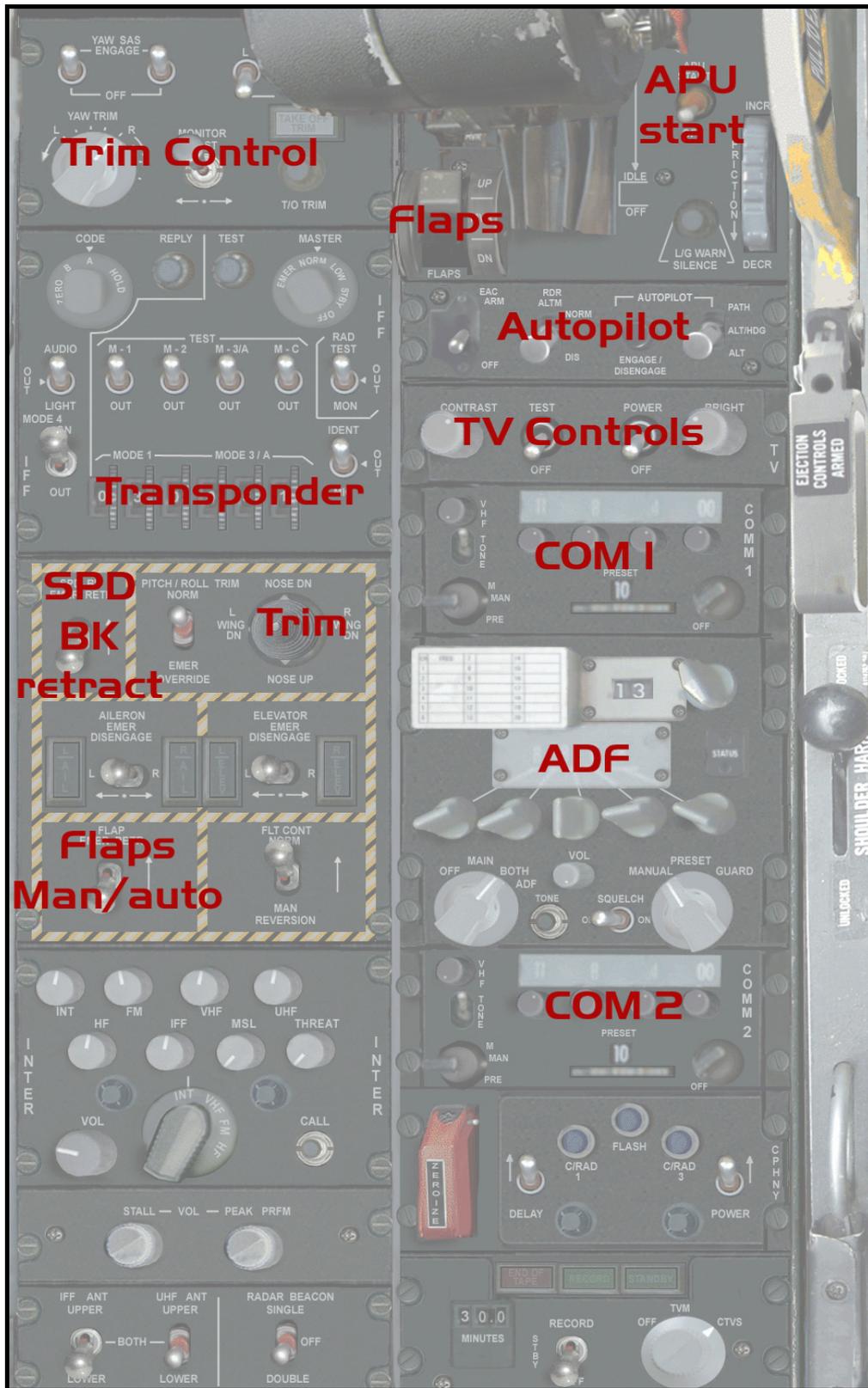
Panel Layout

Main Panel



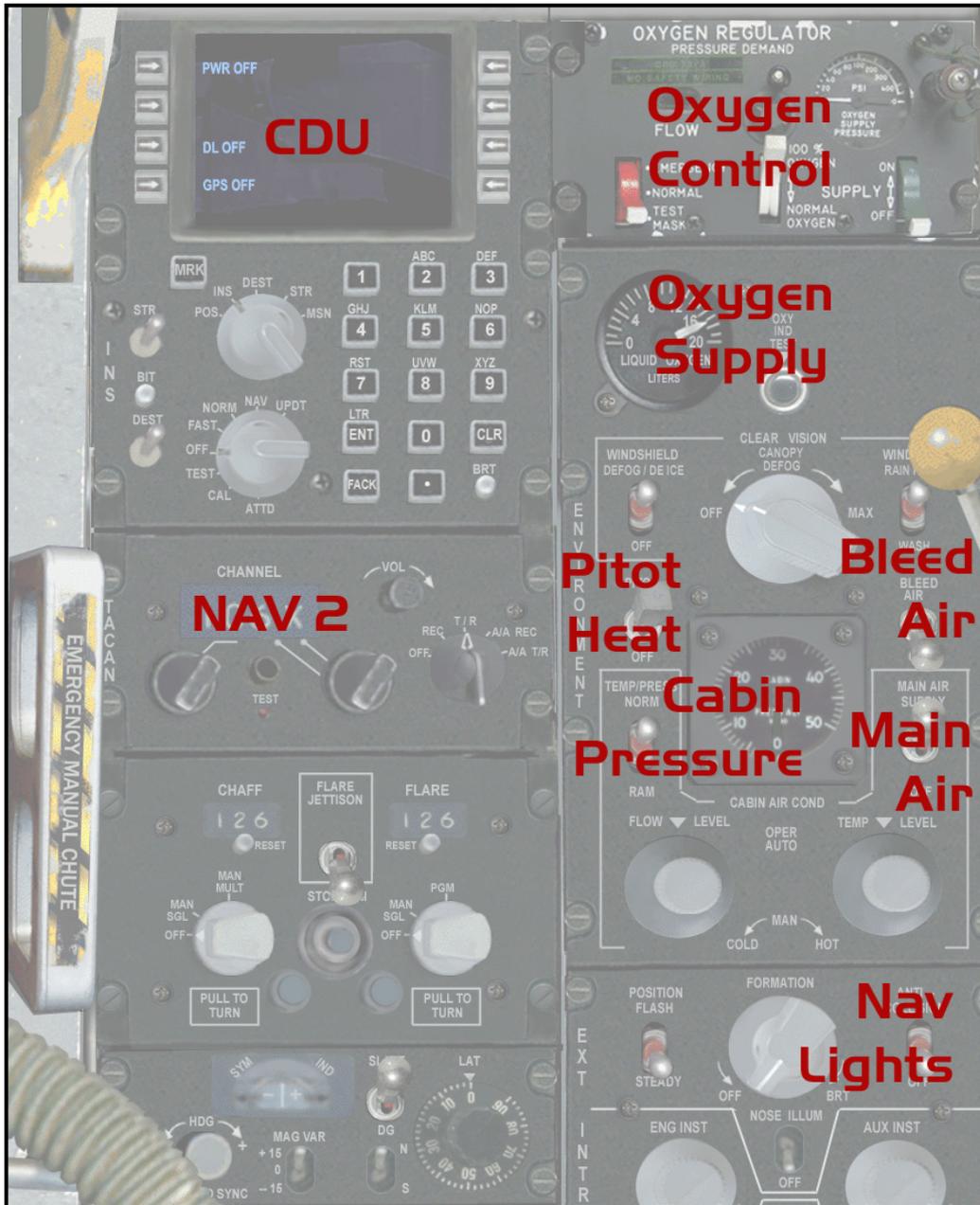


Left Aft Console



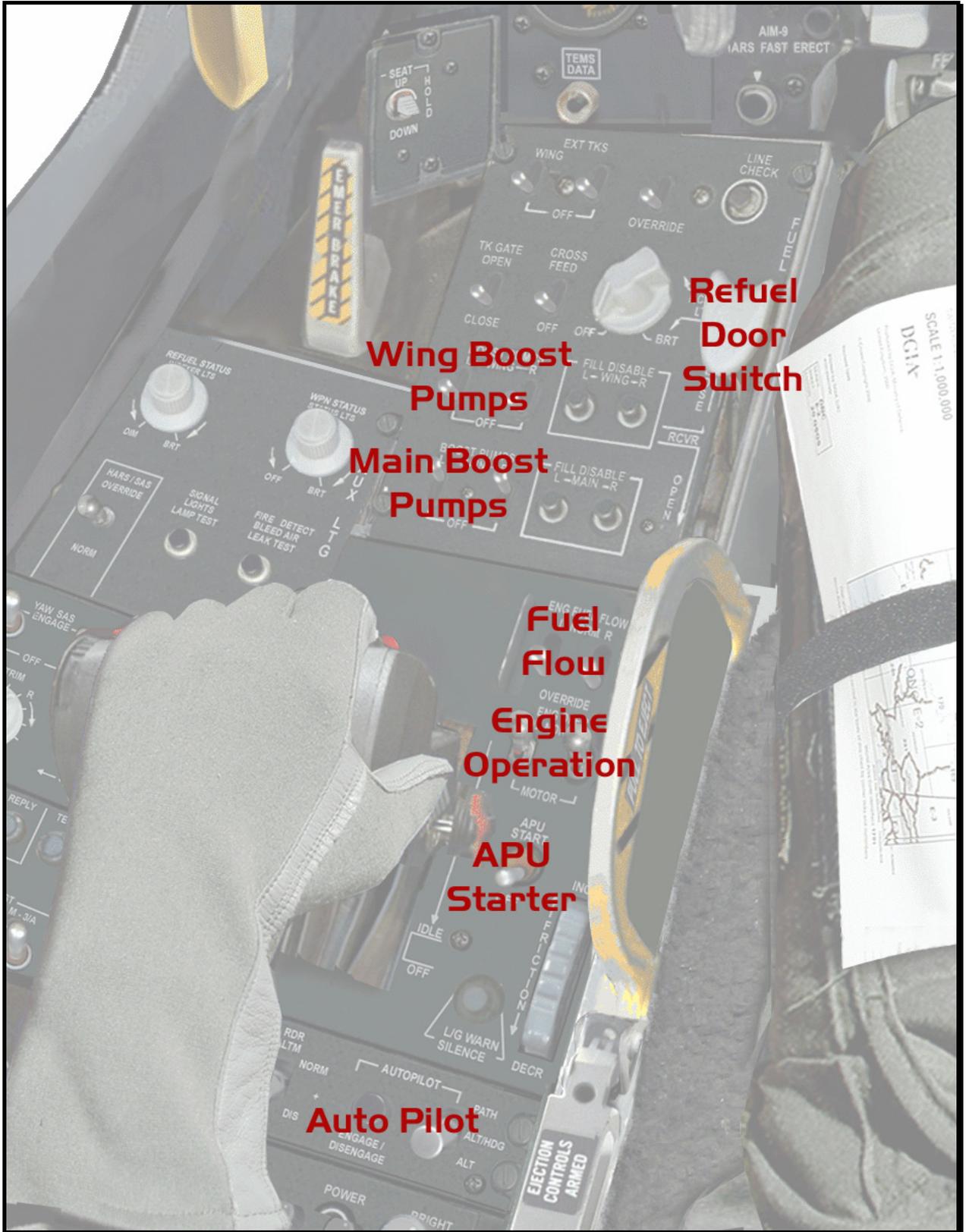


Right Aft Console





Left Console





Animations

There are a large number of animations in this aircraft; of course all standard flight surfaces are animated, but there are additional animations you can use. Retracting the ladder separately from the canopy allows you to taxi with the canopy open.

Water rudder	[SHIFT]-[W]	Lets pilot raise/lower visor
Tailhook	[defined by user]	Open/closes inflight refuel door
Wing Fold	[defined by user]	Open/closes engine covers & ground recepticle
First Door	[SHIFT]-[E]	Open/close canopy
Second Door	[SHIFT]-[E]-[2]	Raise/lower ladder
Strobes	[O]	Ejects flares

Please note that the wing fold and tail hook actions are not assigned to key commands in FS2004. You will need to add these manually. The actual key assignment is optional to your own taste, see below for instructions.



How to add key assignments in FS2004.

1. Open the "Options | Controls | Assignments" menu dialog.
2. Make sure that you see "All Commands" in the "Events Category"
3. Now scroll down until you see the "Wing fold/unfold" event.
4. Double click the event.
5. Press the new key command [control]-[shift]-[1] (or your own choice)
6. Click OK to accept.

Repeat the same for the "Tail hook" event, but assign [control]-[shift]-[2] (or your own choice)

Additional sounds & Bitching Betty

There are several more sounds apart from the more standard sounds of the aircraft. For example when you have the Parking Brakes set you will hear an occasional 'bump'. That's a hatch being closed by the ground crew. You'll also hear the pilot grunt and strain when he is flying high G-loads. Another sound effect that you will hear is Bitching Betty or more accurately, the Audio Warning System. It will give you audio warnings when your flying conditions are not safe. It will also warn you about a possible low fuel situation with the "BINGO" warning. You will hear this caution when you have 200 gallons left. After that you will hear the BINGO caution every time the fuel load halves (so at 100, 50 and 25 gallons) If Bitching Betty is getting on your nerves, you can shut her up (temporarily), by pressing the Master Caution light. She will be silent for 60 seconds.

All these sounds are stored in the [fs2004MainFolder]\Aerosoft\sounds folder. If you don't like them, replace them or delete them.



Systems

Weapons



The main weapon of the A10 is without any doubt the gun. The aircraft is literally built around the GAU-8 Avenger Gatlin Cannon. As Gatlin in the name implies, the gun is made up of several barrels that rotate with one barrel actually firing the shell and the others expelling and loading. This allows a very high rate of fire and keeps the gun cool. You'll see the gun is slightly offset of the centreline, but the barrel that fires is directly centred on the fuselage. Each of the seven barrels is 2.30 meters long, extending far into the aircraft. The shells are about 30 centimetres long, made of depleted uranium or tungsten (PGU14) or an exploding shell (PGU13). The rate of fire is 4000 round per minutes and with 1174 shells loaded it can fire 17 seconds, don't be surprised, for an aircraft gun this is actually a very long time. As the shell weighs around 0,425 kg it means that when you are out of ammunition you have shot around 500kg of hot metal. In other words, thrown a small city car over 1,5 kilometre. There is no active armoured vehicle that can withstand this power and most vehicles are destroyed with just a few shells. Any Warthog pilot will tell you it's the gun that counts.

Of course, the gun is not the only weapon. The A10 carries a vast array of other weapons, from smart bombs to air to air missiles (not to act as a fighter but the theater of operation of an A10 is ideal for helicopters and those are dead meat when they meet an A10):

- MK80 series - Iron bombs.
- GBU 10, 12, 16, 24 – Paveway family, laser guided.
- AGM65 A(EO) ,B(EO) ,D(IIR) and G(IIR).
- Mk77 - Napalm
- Mk20 - Antitank and armoured vehicles, 247 mixed AP and SC bomblets
- CBU52 - Anti personnel and anti material, SUU-30 dispenser delivering 220 HE bomblets.
- CBU58 - Anti personnel and anti material, SUU-30 dispenser delivering 650 bomblets.
- CBU71 - Anti personnel, SUU-30 dispenser delivering 650 bomblets.
- CBU87/B – Anti armor, personnel and material, SW-65 dispenser, combined munitions 202 bomblets.
- CBU89/B - Anti tank and anti personnel, SUU-64 Dispenser with 72 antitank mines and 22 antipersonnel mines (optional FZU-39 proximity sensor).
- CBU97 - SUU-66/B dispenser, 10 BLU-108/B submunitions, 40 hockey puck shaped skeet infrared sensing projectiles(Each BLU-108/B contains four armor-penetrating projectiles with infrared sensors which can detect armored vehicles)
- CBU105 - Same as CBU97 but with the wind corrected munitions dispenser (WCMD) tail kit.
- LAU68 - Rocket launcher
- Aim9 - Air to air missile (IR seeker)
- SUU-25 flare dispensers with 8 LUU-1 target marking flares or 8 LUU-2 illuminating flares

In the simulator you will be able to use the gun. When you are in the air and the gear is in, the joystick trigger will fire the gun. As this is normally linked to the brakes you will also see the brake text displayed. Your ammunition is limited to 1147 shots. The moment you land the gun will be reloaded automatically.



Landing Gear System & Brakes



The landing gear system is a tricycle configuration with the main gear retracting into pods below the wings. The nose gear is offset to allow the installation of the cannon (remember this aircraft is literally built around this gun). All three gears retract forwards (!) to allow free-fall extension aided by aerodynamic force. Emergency extension is strictly manual and can be done without any hydraulic or electrical assistance. The main wheels do not fully retract into the wheel pods, when gear extension is not possible due to battle damage, the aircraft can be belly landed, aided by this design. Brakes are activated on retraction to stop wheel rotation in flight. The A-10 is capable of operating on rough runways and has suspension that has a long travel. This causes the aircraft to pitch nose down more than most aircraft when brakes are operated. Gear retraction/extension takes around 6 seconds.

The wheel shaped gear lever can be seen and operated on the Main Panel, Instrument View and Left Forward Console. There are three lights indicating that the gear is down and locked. When the gear is unsafe the gear lever will be lit in red. When gear retraction is done on the ground the system will warn the user.

Nose Wheel Steering is only available when weight is sensed on the main gear and is disengaged at 80 knots. Operation is indicated by the Nose Wheel Steering lights on the right HD support. Ground steering in The A-10 is relatively simple and straightforward. The wide wheel base makes the aircraft stable, even at higher taxi speeds.

Wheel brakes are hydraulically operated from the left Hydraulic system and are equipped with an Anti-Skid control system.

Flares & Chaff

The A10 has two main threats, small shoulder launched heat seeking missiles and the radar guided anti aircraft guns. It is very hard to defend against the guns, when you get within range you are in big trouble. You have to detect them before you get into range. Against the heat seeking missiles you carry protection in the form of flares that eject from your aircraft and create additional targets. If you are flying in a theater that is rich in targets (in other words, dangerous) flares are used as a precaution and are ejected when you egress the area. When you detect a missile the best defence is to eject flares, make a 90 degree high G turn and when possible reduce throttle to decrease your heat signature. Against any radar guided threat (either gun or missile) you can use 'chaff'. Foil in thin strips ejected into the air as a radar countermeasure.

In the simulator the flares are available and they are linked to the standard Strobes [O] command in FS2004. When you press the [O] key a salvo of flares will be ejected. They will burn for 6 seconds.



Threat Warning System



The Threat Warning system normally displays all threats to the aircraft. Normally these are radar systems, either located on the ground (AA guns or missiles) or in the air (AWACS or attack radars on fighter aircraft). If you are on a mission you would prefer to keep this display as clear as possible. For the simulator we decided to display other aircraft (so as a sort of air radar). There is a small knob on the top right corner of the gauge; you can use this to set the scale between 12 and 120 miles, in steps of 12 miles. The current scale will be displayed for a second. This instrument uses the TrafficInfo module that MS made available in the Traffic SDK.

Flaps and Slats



The A-10 has simple four wing trailing edge flaps. The flaps have three settings; 0° (UP), 7° (MVR) and 20° (DN) and are normally controlled by the Left Hydraulic system. The slats (leading edge flaps) are automatic, when the system detects a condition that could lead to an engine stall, they will extend. This will happen at high Angles of Attack at high speeds.

There are 4 flaps/slats settings

1. All retracted
2. Leading Edge Extend, Trailing Edge up
3. Leading Edge Extend, Trailing Edge 7°
4. Leading Edge Extend, Trailing Edge 20°

Using the standard Flaps keys of FS you can select any of these settings.

Automated flaps

- When your airspeed drops under 200 knots IAS, the trailing edge flaps will extend. You will be able to manually extend and retract the trailing edge flaps.
- When your airspeed exceeds 200 knots IAS trailing edge and leading edge flaps will be retracted to avoid them being ripped off.
- When either the Left Hydraulic system or the Electrical system fails aerodynamic forces will force the flaps to retract one setting (so 20° to 7° or 7° to 0°).
- **You can put all flaps/slats in manual mode by setting the Flap Emergency Retraction switch to the UP position.**





Fuel system



The A-10 has 4 internal tanks two in the fuselage and two in the wings. All tanks are foam filled to avoid explosions when they are pierced by bullets. The Fuel Quantity Indicator on the instrument panel shows the total amount of fuel in digits in the center of the gauge. The rotary switch allows you to show more detailed information. Two pointers will indicate how much fuel there is in each tank. The switch has 5 settings;

1. INT (Total internal tanks)
2. MAIN (Fuselage tanks)
3. WING (Wing Tanks)
4. EXT WING (External Wing Tanks)
5. EXT CTR (External Center Tank)



The TEST button will test the system. When you press it 6000 LBS of fuel will be displayed. Just select any other mode to get out of the test mode.

On the Fuel System Control Panel you control the pumps and the In Flight Refueling Door.

The big white lever controls the fuel door on the nose of the aircraft. Normally the lever is in the CLOSED position, when you are about to dock with the tanker you open the door. The door is not visible unless you lean forward in the Virtual Cockpit.

The 4 boost pumps control the electrical pumps that feed fuel to engines. In normal operation they will always be on. On the Throttle Quadrant there are two Engine Fuel Flow switches that can have to be on the NORM for normal operation and are only used to switch off the engines by switching them to the Override position.





Throttle Control and Engines

The A-10 has a startup system that is designed for very fast operation so the aircraft can be scrambled very fast to support troops, this startup is described in the Scramble checklists. There is also a standard Startup that is described in the Procedures. The image right shows the fuel switch settings needed to start the engines.

Standard Startup

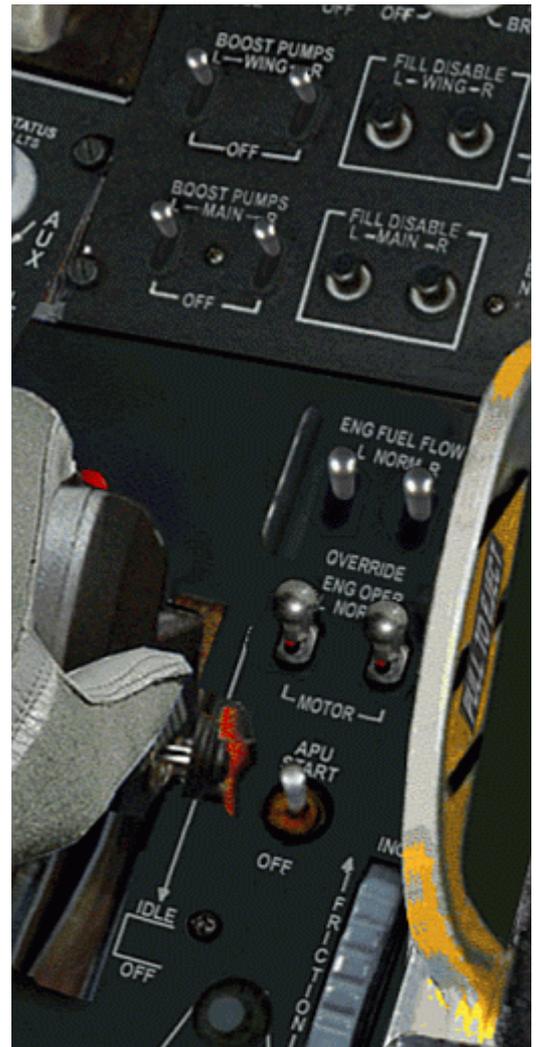
To start the engine you will need to have the APU running providing the bleed air and electricity. The bleed air system is fully automatic. With all fuel switches and all boost pumps on, using the Engine Operate switches will start the engine. When the engine is running the switch can be set back to the NORM setting.

Scramble Startup

With the switches in the setting shown in the image right, the engines (both, almost at the same time) will also start when you advance the throttle beyond idle.

Engine Shutdown

To shut down an engine just set the corresponding Engine Fuel Flow switch in the OVERRIDE setting. This cuts the fuel flow to that engine.





HSI

The Horizontal Situation Indicator in this aircraft is a lot like that in the default aircraft in FS2004. The only problem you might have is that it is rather small and located very low in the cockpit. The graphic below will show all elements and their function.



Autopilot

The A-10 has a rudimentary autopilot system, in fact many A-10 pilots will joke it is only for when you have to sleep or when you want to eat your sandwiches. The AP system, toggled on/off by pressing the small button on the Autopilot Console (Left Main Console) marked ENGAGE/DESENGAGE. When active the button will be lit.

There are three AP modes;

- **PATH** = will level the wings and keep the current pitch.
- **ALT/HDG** = will keep current altitude and heading.
- **ALT** = will keep current altitude.

The ALT/HDG mode will follow the Heading bug that can be set on the HSI.



TV Monitor / CDU

There is a rather large display on the right of the main panel. Normally this is connected to several weapon systems and sensors. As these are all nonfunctional we decided to make it into a system that displays all information you could ever want on the aircraft inside the simulator. On the real aircraft a lot of this data is to be found on other screens, so we only took the liberty of combining the data in many cases. Using the buttons 1, 2, 3, 4, 8 and 9 on the Armament Control Panel you can select the 9 different displays, if there is more than one screen you can press the button again to cycle through the pages. You will find these screens to be a big help under any condition. A copy of this information is sent to the computer screen on the Right Aft Console.



On the left aft panel you will find a power switch for the TV screen. You can switch the TV off, but when you load the aircraft we'll have it activated again.



Screen 1, Navigation.

On this screen you will see the information on your current location, speed, heading and track, what the wind is etc. It basically informs you about the conditions.

Screen 2, Waypoints

The Waypoints screen shows you all information on the waypoints of your flight plan. This system will load ANY flight plan that has been loaded in FS2004. Just use any tool, or FS itself to create the flight plans. Cycling through the waypoints you see all details on the waypoints. Please note that this screen is only active when a flight plan is loaded. Do check the paragraph on navigation for more information.

Screen 3, Engine Data

These two screens show you all detail on the state of your engine. From all temperatures to all pressures.

Screen 4, Electrics

On these two screens (one for each bus) you can see the details on the electrical system. If you've got any electrical problems you will notice them here before warning lights will be lit.

Screen 5, Controls

On this screen you will see the settings of all control surfaces, including the trims. You'll soon learn to use it to find the best settings to keep the plane nice and smooth.

Screen 6, Attitude

Yes, this aircraft has quite an attitude, but in this case you will be presented with a screen that shows you exact data on how the aircraft flies in relation to a level plane. Even the slightest bank that you could trim out is shown.



Navigation

The A10 has a rather ancient navigation system largely based on radio beacons that are not included in FS. So we replaced this system with something that is rather similar but a lot less complex to use. As it is based on the default FS2004 flight plans it is compatible with virtually all tools that create flight plans, even the one included in FS is pretty good. Just create the flight plan and activate it in FS. From that moment on you just have to follow the dot to get to where you want to go!



When a flight plan is loaded you can look at each waypoint on the TV Screen / CDU. You will get the full name, the location, altitude, heading to the waypoint, distance etc... Basically all you need to get to the waypoint. When you get close to the waypoint the next will be chosen and displayed. But there is an even better way to fly to the next waypoint. Using the HUD display.



The moment a waypoint is loaded the HD will display the Active Waypoint name and a small circle will appear on the centerline. When you keep that circle centered you will be on the correct heading to the waypoint. Please note that the circle can be 'hidden' at the left or right side and you will have to be within 45 degrees of the heading to the waypoint for it to start moving. In the left top corner you see the distance to the waypoint.



HUD



The Head Up Display is controlled with 2 panels that can be seen on the Main Display and the Instrument View.



There is a small display below the HUD that controls what data is displayed. There are two working switches on this panel.

- The ALT switch toggles between barometric altitude display and radar altimeter display. Don't confuse the two.
- The DATA switch toggles between ladder display and digital display of altitude and airspeed.

The HUD Control Panel has two working switches. The HUD Mode Selector cycles through three settings;

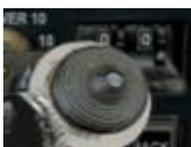
- OFF (only 3 small orientation markers shown)
- TEST (showing all possible data, excluding waypoint data)
- NAV (showing the standard HUD)



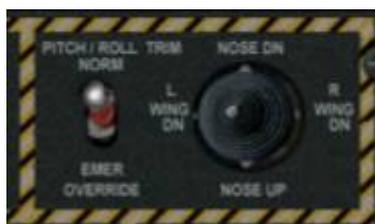
The HUD brightness switch controls the brightness of the HUD.

- AS (Auto Sensing, will switch day/night mode automatic)
- NITE (Night setting)
- DAY (Day Setting)

Trim



The A-10 can be trimmed on all three axis. Of course the standard FS2004 keys will work, but you can use the POV switch (visible on the Instrument panel) on the stick to set the aileron and elevator trim. The yaw trim can be set on the Stability Augmentation Panel (Left Main Console) using the yaw trim button. To set Take Off trim, you press the T/O TRIM button on this panel. The green light will show T/O trim is set.



Toggling the Pitch/Roll NORM switch will reset the trims to zero. Of course you can see the trim settings on the CDU display.



Radios

The A-10 has all the radios military aircraft use, unfortunately this does not suit the selection offered by FS2004. So some radios are used slightly differently.



COM1 + COM 2

The two communication radios are located on the Left Aft Console. They act as any communication radio you will ever use in FS2004.

To set the frequencies use the two center buttons under the display.



Transponder

The transponder (or IFF as the military call it) is located on the IFF Control Panel. We chose to use the 4 most right digits as the XPDR setting. You can just click on the scroll wheels to set the frequency.



ADF

We moved the ADF radio to the UHF Radio Control panel. Using the right four knobs under the display let's you set the frequencies. You will see the needle pointing to the tuned NDB station on the HSI gauge.



NAV1

The NAV 1 radio is located on the Left Console on the ILS Control Panel. We chose this panel because NAV1 is normally the radio used for ILS stations.



NAV2

The NAV2 radio is also located on the Left Console in the TACAN Control panel. TACAN is a military radio system not simulated in FS.





Lights



There are two separate light systems. One is for normal flight and the second is for combat conditions. The low level combat lighting is



designed so it allows other aircraft to fly in formation at night. It consists of green strips of light on the fuselage and wings. These can be seen from a short distance and are controlled with a rotary switch on the fuel panel. Please note that the A-10 does not operate in its Close Air Support role at night.



The standard external lights are controlled by Position Lights and Anti Collision Lights switches. In any condition they are used together. The panel lights are controlled by the Aux Instrument light switch. Please note that the mirrors will also be 'switched off' when the panel lights are manually switched off. The landing lights, mounted on the nose gear, are operated from the main instrument panel.

Important note; do NOT use the [L] key to switch on the lights. As we use the lights for the gun effects and for some other special features, this will cause problems. Only use the panel switches to operate the lights.

Because of the limited options for effects you might (or rather most probably will) see some external effects like flares being ejected when you switch on lights.



Procedures

External Inspection

Do a full walk around the aircraft, starting at the ladder, moving clockwise. Check for any oil stains showing, wheel chocks, water intrusion and open hatches/doors.

Before entering cockpit

1. Canopy actuator Check locked
2. Canopy controls Check
3. Ejection seat Check
4. Flight publications Check

Cockpit interior check

1. Loose, foreign objects Check
2. Strap in connections Check
3. Rudder pedals Adjust

Left Console

1. Armament Safe
2. Utility Light Stowed
3. IFF antenna OFF
4. UHF antenna As Required
5. Radar Beacon Off
6. Intercom Set
7. Emergency Flight Control Panel All off
8. Throttle Full back
9. Throttle Friction Set
10. Speed Brakes Control Closed
11. APU Switch Off
12. Engine Operate Switches Norm
13. Engine Fuel Switches Norm
14. Fuel System Control Panel Check
 - a. Wing Boost Pump L/R WING
 - b. Main Boost Pump L/R MAIN
 - c. Remaining Fuel Switches ... OFF/CLOSE

Instrument Panel

1. Landing Gear DOWN
2. Landing Lights/Taxi Lights OFF
3. All Armament switches OFF/SAFE
4. Clock SET
5. HUD Mode SET
6. Standby Compass CHECK



Right Console

1. Electrical panel SET
 - a. APU Generator OFF/RESET
 - b. AC Gen L/R OFF
 - c. Battery Switch OFF
 - d. Emergency Flood Lights OFF
2. ECM OFF
3. ILS Control OFF
4. CDU OFF
5. Chaff Flares Panel ALL OFF/SAFE
6. Oxygen CHECK
7. Environment Control Panel ALL OFF
8. TACAN Control Panel ALL OFF
9. Lighting Control Panel SET
10. HARS Control Panel SET

Prior to Engine Start

1. Parking Brake SET
2. Gear Lights CHECK
3. ITT BELOW 150°
4. Fuel TEST
 - a. Test Indicator Buttons PRESS
 - b. Read and check 3000/3000/6000
5. Fuel Display Selector TEST
 - a. Verify all settings, return to MAIN
6. APU Switch START
7. APU Generator Switch PWR

Note, the Generator needs to be on to provide cooling. Do not operate the APU for more then 5 minutes without APU Generator ON

Starting Engines

1. Engine Operating Switches CHECK NORM
2. Parking Brake CHECK SET
3. Left Engine Operating Switch MOTOR
4. Left ITT CHECK RAISING
5. Left oil pressure CHECK RAISING
6. Left hydraulic pressure CHECK RAISING
7. Left Engine Operating Switch NORM
8. Repeat for right engine



Before Taxi

1. TV / CDU ON
2. Radios AS REQUIRED
3. IFF SET
4. Air Refuelling Door CLOSED
5. Emergency Brake Handle FULL FORWARD
6. HUD TEST
7. Flaps CYCLE and SET
8. Speed Brakes CHECK
9. Flight Controls CHECK
10. Takeoff Trim SET
11. Altimeter SET
12. Pitot Heat ON
13. ADI CHECK MOVEMENT
14. Altimeter CHECK/SET
15. HUD Mode Selector TEST, SET TO NAV

16. APU GEN OFF
17. APU SWITCH OFF
18. Ladder STOWED

Taxi

1. Nose wheel Steering CHECK
2. Brakes CHECK
3. Turn Needle CHECK

Before take-off

1. Engine Instruments CHECK
2. Flaps SET MAN
3. Speed Brakes CHECK CLOSED
4. Take Off Trim SET
5. Canopy CLOSED/LOCKED

Lineup Check

1. Flight Instruments CHECK
2. Pitot Heat ON
3. Throttle 90% CORE RPM
4. Engine Instruments CHECK
5. Warning and Caution lights ALL OFF

Takeoff

1. Brakes RELEASE
2. Throttle MAX
3. Engine Instruments CHECK



Initial Climb

- Maintain takeoff pitch during acceleration to climb speed.
- When positive rate is achieved (AGL > 100ft).
- When takeoff speed + 10 achieved retract flaps

Flight

There is no requirement for the pilot to refer to checklists during normal flight. Items to check regularly include Oxygen, Fuel and Cabin Pressure

Descent / Before Landing

1. Altimeter SET
2. Speed Brakes AS DESIRED
3. Landing Lights AS DESIRED
4. Fuel Quantity..... CHECK

Before Landing / Circuit

Initial Approach Speed 250-300 knots

Landing

- When landing is assured retard throttles to just above idle. Touchdown speed is 10 knots less than final approach speed.
- Landing in gusts should be done with half the gust wind speed to the final approach and touch down speed.
- Tail strikes are a real hazard for the A-10 due to its design, great caution should be take to avoid this.
- Crosswind landings can best be done with a combination of crabbing into the wind and wing low because it offers the best combination of visibility and pilot work load. Just before landing the rudder will be used to smoothly align the aircraft with the runway. Crab angle on touchdown should remain below 10°. Be ready to counter the strong weathervane effect during landing roll. For crosswind components over 20 knots, add 10 knots to the landing speed.
- Touch and goes are done by smoothly advancing the throttles, expect less then perfect directional control due to uneven spooling up of the engines.

After Landing

1. Throttles AS REQUIRED
2. Speed Brakes AS REQUIRED
3. Nose Wheel Steering CHECK

After clearing runway:

1. Ejection Seat SAFE
2. TV..... OFF
3. HUD SET TO DAY
4. HUD OFF
5. Lights OFF
6. Pitot Heat..... OFF
7. Flaps RETRACTED



Engine shut down

1. Ejection seat SAFE
2. TV OFF
3. HUD controls SET TO DAY
4. HUD controls OFF
5. Lights OFF
6. Pitot heat OFF
7. Flaps RETRACTED
8. Parking brakes SET
9. Engine Operating switches NORM
10. Left Engine Fuel Flow OFF
11. Engine instruments CHECK
12. Right Engine Fuel Flow OFF
13. Engine instruments CHECK
14. All fuel pumps OFF
15. All Oxygen OFF
16. All Electrical OFF (expect BAT)
17. Canopy OPEN
18. Ladder EXTEND
19. Visit toilet CHECK

Canopy Open

1. Boarding Ladder..... EXTEND

Caution, before extending ladder check that ground personnel are clear
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Scramble checklists

Scramble checklists are used when the aircraft is on standby and needs to be ready for take-off in a matter of minutes. In FS they can be used as simplified checklists to get the aircraft up and running.

In the Scramble Checklist the system settings are set in such a way that the engines start with just advancing the throttles. It is even possible for the aircraft to spend up to an hour with all done up to the Start-up setting, so with the APU running and only advancing the Throttle is needed to start the engines. If the aircraft is stationed at a runway holding it could be in the air within 90 seconds of the scramble.

Alert

Perform prior to the aircraft assumes alert status

Exterior Inspection COMPLETE
Interior Inspection COMPLETE
Pre Start-up Checklist COMPLETE

Pre Start-up

Throttle FULL BACK (press F1)
Parking Brake SET
Battery switch ON
All Fuel Pump Switches ON
Fuel Flow Switches ON
Engine Override Switch NORM
APU Switch START
APU RPM 100% CHECK
APU GEN ON

Start-up

Throttle ADVANCE
Engine Instruments CHECK
APU Generator OFF
APU Switch OFF
Lights SET
HUD SET

Scramble, before takeoff

Flaps SET
Speed Brakes RETRACTED
Take Off Trim SET
Pitot Heat ON
Warning / Caution lights OFF



Typical Overhead Landing Pattern

- Gross Weight 30.000 Lb
- Add 2 Knots Per 1.000 For Weight Above 30.000 Lb For All Speeds Except Initial Approach Speed And Downwind.

