



AJ-2 SAVAGE

USER MANUAL

INTRODUCTION

The AJ Savage was the first U.S. bomber designed especially to carry the atomic bomb. In the aftermath of World War II the nuclear defence of the nation had been squarely in the hands of the US Air Force until the Navy campaigned hard to acquire its own nuclear attack capability. They correctly argued that an attack using carrier-borne aircraft would give world-wide range and would not require a fighter escort, due to the low-level attack profile which was envisaged. In 1947, the USAF with its B-36 could not compete on these points. The Navy mission involved the carrier leaving the area as soon as the bomber was launched, the aircraft's crew would then deliver the bomb and return to ditch in the sea, supposedly to be picked up by a waiting submarine.

The XAJ-1 prototype first flew in September 1948. The addition of a centrifugal jet turbine to a prop-driven aircraft was not new (the B-36 already had additional jets), but it was the first time this concept had been used on a carrier. The jet powerplant was intended for take-off, run-in on the target and in the event of failure of the other engines.

The first take-off and landing by the production AJ-1 occurred in 1950 on the USS Coral Sea. Early AJ-1s had a shorter vertical stabiliser as well as an upward-canted tailplane. These features were lost when the AJ-2P photo-reconnaissance version was introduced late in 1950. The AJ-2P format, including a new cockpit layout with a central throttle quadrant and all three crew now on the same level, was then carried over into AJ-1 production, becoming the AJ-2B.

The role of the bomber Savage was relatively short lived, most aircraft were used in the photo-recon role or converted to in-flight refuelling tankers. Three detachments of AJ-2Ps were deployed in Korea during the war in 1953 and were used to gain intel over Communist China. The Savage was eventually phased out completely in 1957 with all its roles taken over by the Douglas A-3 Skywarrior.

INSTALLATION

An easy installation is provided by way of an auto-installer, the AJ-2 Savage will be installed to the default FSX folder structure. The install path can be edited in the Installer Dialogue to reflect a custom installation path such as E:Games\FSX\ for example.

Extras such as this manual will be installed into FSX/Virtavia. A start menu entry will also be made, with an uninstaller should you ever wish to remove the product.

Please see the 'Package Contents' section for more details on what is included in this package.

CREDITS

Exterior model – Virtavia

Textures – Virtavia

Interior model - Virtavia

Gauges – Herbert Pralle/Virtavia

Animation coding – Virtavia

Flight Dynamics - Mitch London

Engine Sounds - Virtavia

Manual - Virtavia

Testing - Frank Safranek, Mitch London, Virtavia

Recommended reading : Naval Fighters 22, by Steve Ginter

ISBN 0-942612-22-1

SUPPORT

Should you experience difficulties or require extra information about the Virtavia AJ-2 Savage, please e-mail our technical support on tech.support@virtavia.com

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PACKAGE CONTENTS

The Virtavia AJ-2 Savage package contains three model variants and five texture sets, representing the following aircraft :

AJ-2B, 134058, VC-6, USS Yorktown, 1954



AJ-2B, 134052, VAH-7, USS Forrestal, 1956



AJ-2B, 134052, VAH-7, NAS Sanford, FL, 1958



AJ-2P, 128046, VJ-62, NAS Sanford, FL, 1954



AJ-2P, 130422, VAP-61, Guam, 1956



EXTERIOR MODEL

The exterior model has all the usual animations such as ailerons, elevators, cowl flaps, wing fold, tail hook and landing flaps. There are no speedbrakes fitted to the Savage, this function is reserved for the bomb bay doors and refuelling system deployment.

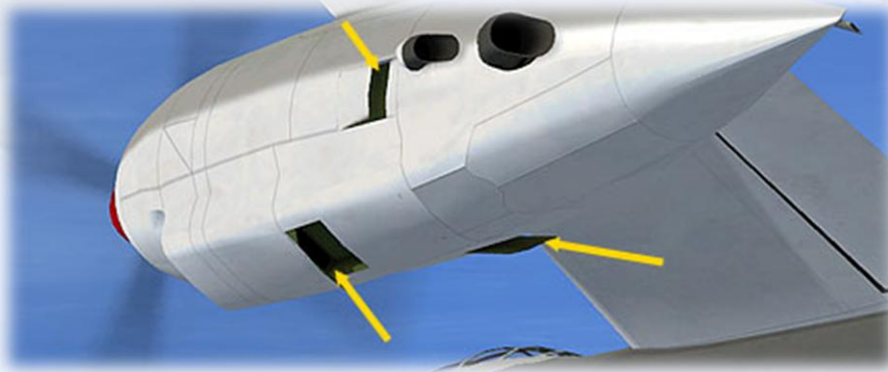
Jet intake Door

The dorsal air intake for the jet engine will open automatically when engine 3 fuel valve is activated. The switch for the fuel valve on the pilot's left console.



Oil Cooler and Intercooler Flaps

Each engine nacelle is fitted with a ventral oil cooler flap and a pair of turbo intercooler flaps on the sides. These are opened by means of covered switches on the front vertical area of the pilot's left console.



Bomb Bay and In-Flight Refuelling System



The spoiler key (FSX default is forward slash '/') is used on the Savage to open the bomb bay doors on the AJ-2B bomber variant. The tanker version of the AJ-2B additionally deploys the in-flight refuelling hose and drogue system. Note on the tanker version there is a slight delay before the bomb bay doors open, about 2 seconds. This is a necessary part of the animation. The AJ-2P reconnaissance version does not have opening bomb bay doors, so the spoiler key has no function.

Exits

Shift-E : Crew entry door, ladder deploy, right side

Shift-E+2 : Canopy window, right side only

Shift-E+3 : Toggle visibility of bombs in bomb bay

Shift-E+4 : Fold vertical stabiliser for stowage

Access ladder

Not an animation as such, the steps will appear when the engines are off and the main exit door is open.

Crew figures

The crew figures can be toggled using Ctrl-W.

Propellers

The propeller blade pitch is animated through the range from fine to coarse pitch. There is also a special animation for feathering the blades in the event that an engine needs to be shut down in flight. This turns the blades edge-on into the slipstream for minimum drag.

Propeller Pitch Settings

Minimum Pitch (high RPM)

Use Ctrl-F1 or mouse the pitch levers on the throttle quadrant. Note how the blades are 'flat' to the airflow, this is termed the minimum, or 'fine' pitch.

Maximum Pitch (low RPM)

Use Ctrl-F4 or mouse the pitch levers on the throttle quadrant. The blades are now angled to the airflow and can 'bite'. Always have the props at this setting when starting or when at idle.

Feathered

Prop feathering is activated by pressing the large red button on the Prop Feathering Control Panel at the front of the throttle quadrant. This will stop the engine and simultaneously turn the blades to the minimum drag position.

LIGHTING

Pressing the L key will turn on all lights. You may however wish to turn them on using the appropriate switches in the cockpit, as the L key also turns the on navigation and both instrument and red flood lighting in the cockpit, which should ideally be switched separately.

The ventral beacon light is not used as it causes distracting flashing in the cockpit at night due to a limitation of FSX. It may be enabled if desired by 'uncommenting' its entry in the [Lights] section of the AJ-2's aircraft.cfg.

In common with other US Navy aircraft of this era, the AJ-2 Savage was not fitted with landing lights.

Please refer to the cockpit section of this manual for information regarding light switch location.

ALTERNATIVE VIEWPOINTS IN FSX

There are several different ways of looking at the aircraft and the cockpit, select these alternative views by right-clicking in an empty area and picking the 'Aircraft' menu for external views and the 'Cockpit' menu for views inside the cabin. It is possible to zoom and pan as normal in these alternative views. Cycle through the available ones by pressing the A key.

External View Options

It is possible to pan and zoom as normal in all external views.

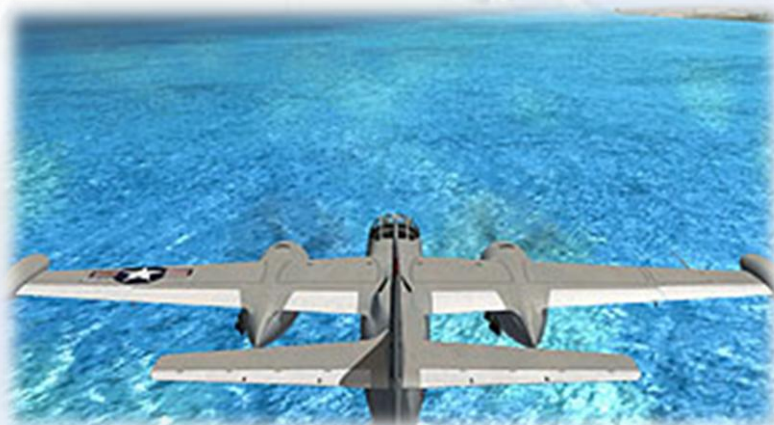
Right Wing View



Left Wing View



Tail View



Nose View



Cockpit View, Left



Cockpit View, Right



Interior Views

It is possible to pan and zoom as normal in all interior views.

Virtual Cockpit View



Copilot's Seat View



Cockpit Center View



Cockpit Rear View



Cockpit view from entrance



Moving Around the Cabin

Shift-Enter and Shift-Backspace : moves up and down

Ctrl-Shift-Enter and Ctrl-Shift-Backspace : moves side to side

Ctrl-Enter and Ctrl-Backspace : moves back and forwards

VIRTUAL COCKPIT FUNCTIONS

MAIN PANEL • LEFT SIDE



1) **Landing Gear Warning Lamp.** Illuminates only when gear is in transition, ie. not locked.

2) **Airspeed Indicator.** Shows the present airspeed in knots. The yellow marker indicates the stall speed, the first red marker indicates max. speed at sea level, the second red marker indicates max. speed at 35,000 feet.

3) **Gyro Compass.** A standard G2 gyro compass indicator, the fixed aircraft pointer indicates the present direction of flight against a rotating compass card. The smaller compass disc at the center reads magnetic North and would be used to check proper functioning of the gyro

compass. The knob at the lower right of the gauge can be used to set the autopilot heading hold, the small yellow pointer indicates the current value. Note the pointer will disappear into the lower half of the casing so it is preferable to use the pop-up autopilot panel to set all AP values.

4) **Artificial Horizon.** The right side knob cages the indicator.

5) **Sim Icons.** Quick links to FSX functions for ATC, Radios, GPS, Map, Kneeboard and Autopilot. The lowest icon will toggle the control yoke.

6) **Exhaust Gas Temperature.** Shows the temperature produced aft of the turbine in the jet engine.

7) **Vertical Speed Indicator.**

9) **Altimeter.** Standard altimeter, knob right side for Baro Setting. Use left/right mouse click, mousewheel or left click drag to adjust.

9) **Turn and Slip Indicator.**

10) **Course and Drift Indicator.** Functions like a ILS indicator with the aircraft symbol acting as a pointer indicating deviation left or right from the current set NAV1 OBS. The gauge includes the usual vertical and horizontal bars to indicate the relative direction of the tuned VOR or runway LOC and the glideslope (GS). The numerical display shows the current course (NAV1 OBS) setting and is adjusted using the knob at the bottom right of the gauge. Warning flags display when there is no valid LOC or GS signal.

11) **Engine RPM Indicator (Turbine only).**

12) **Engine RPM Indicator.** Dual needles indicate the RPM of the reciprocating engines.

13) **Tail Hook Lever.** Pull to deploy tail hook. Nearby amber lamp indicates successful deployment.

14) **Engine Temp. / Pressure (Turbine only).**

15) **Engine Manifold Pressure Indicator.** Dual needles indicate the vacuum pressure in in/Hg of the reciprocating engines.

MAIN PANEL • RIGHT SIDE



1) **Low Altitude Warning Lamp.** Illuminates when radar altitude is 500ft or less and landing gear is retracted.

2) **Radar Altimeter.** Indicates the height of the aircraft above the ground or water to a maximum of 800 feet.

3) and 4) **Navigation Radios.** These are used to set the NAV1 and COM1 frequencies. Due to FSX limitations, the knobs will not rotate

when the mouse is used, although this does not prevent the displays being set. An alternative is to use the radios pop-up panel via the radios Sim Icon or by pressing shift-2. The outermost knobs will however animate and are used to toggle the audio signal.

5) **Accelerometer.**

6) **Trim Indicator.** This gauge is mousable and can be used to adjust roll and yaw trim.

7) **DME Indicator.** Displays distance to the presently tuned NAV1 VOR/ILS in nautical miles.

8) **Radio Magnetic Indicator.** A standard RMI with the larger needle for indicating the direction of the tuned NAV 1 station and the smaller needle for indicating the direction of the tuned NDB. The yellow heading bug indicates the current autopilot heading setting.

9) **Master Engine Fire Warning Lamp.** Will illuminate and flash if an engine is on fire. Refer to individual fire warning lamps on pilot's left console to determine which engine.

10) **Engine Oil Pressure Indicator.** Displays the lubricating oil pressure for both reciprocating engines.

11) **Engine Fuel Pressure Indicator.** Displays the fuel pressure for both reciprocating engines.

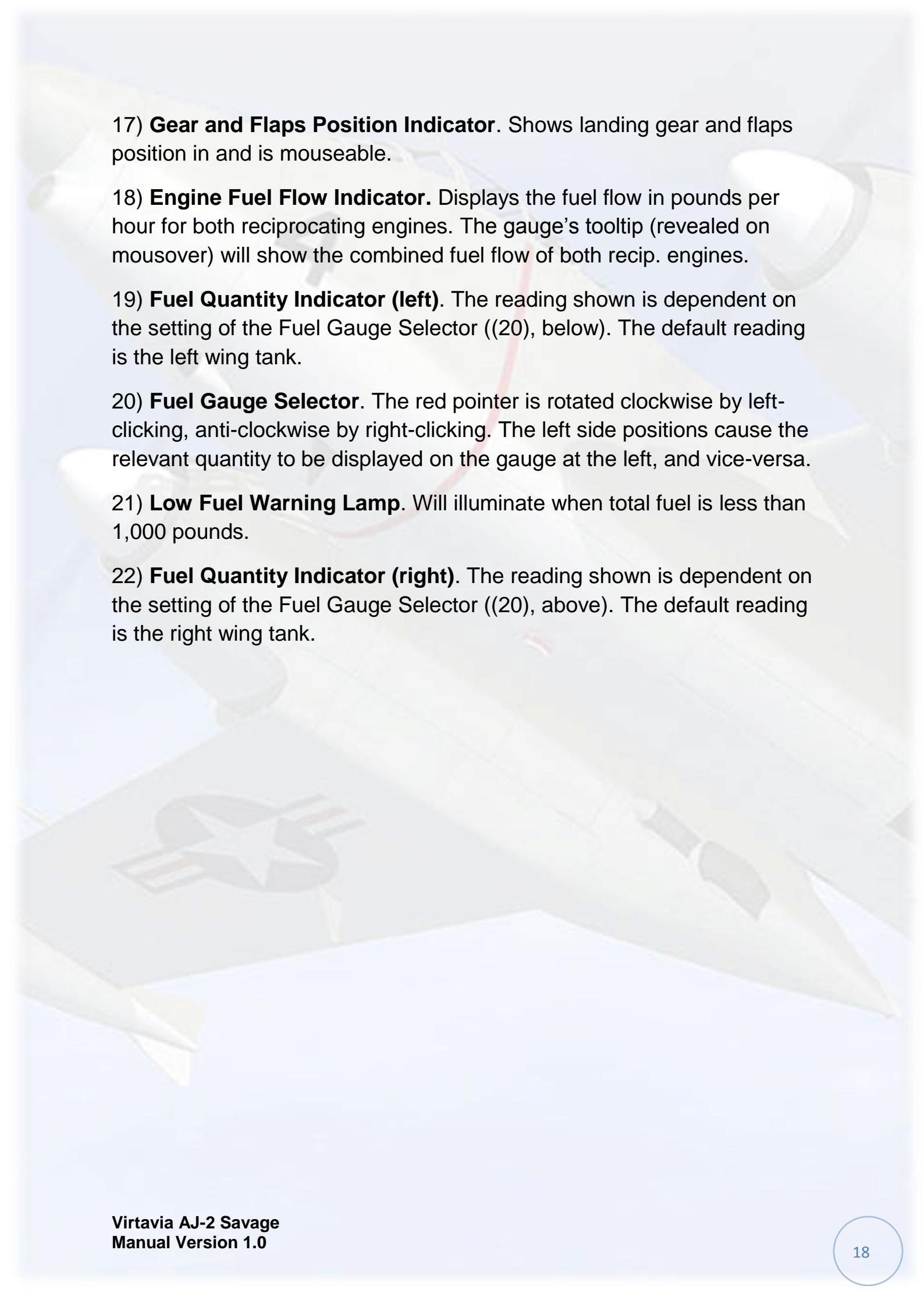
12) **Carb. Air Temp. Warning.** Illuminates if the carb. temperature for either reciprocating engine is zero degrees C or less. The Engine Anti Ice switches on the pilot's left panel should be switched on to rectify this.

13) **Clock.** The knob can be clicked to toggle Local and Zulu time.

14) **Carb. Air Temp. Indicator.** Displays the carb. temperature for both reciprocating engines.

15) **Cylinder Head Temp. Indicator.** Displays maximum temperature of both rows of 9 cylinders on each reciprocating engine.

16) **Engine Oil Temp. Indicator.** Displays the lubricating oil temperature for both reciprocating engines.



17) **Gear and Flaps Position Indicator.** Shows landing gear and flaps position in and is mouseable.

18) **Engine Fuel Flow Indicator.** Displays the fuel flow in pounds per hour for both reciprocating engines. The gauge's tooltip (revealed on mousover) will show the combined fuel flow of both recip. engines.

19) **Fuel Quantity Indicator (left).** The reading shown is dependent on the setting of the Fuel Gauge Selector ((20), below). The default reading is the left wing tank.

20) **Fuel Gauge Selector.** The red pointer is rotated clockwise by left-clicking, anti-clockwise by right-clicking. The left side positions cause the relevant quantity to be displayed on the gauge at the left, and vice-versa.

21) **Low Fuel Warning Lamp.** Will illuminate when total fuel is less than 1,000 pounds.

22) **Fuel Quantity Indicator (right).** The reading shown is dependent on the setting of the Fuel Gauge Selector ((20), above). The default reading is the right wing tank.

PILOTS LEFT SIDE PANEL



- 1) **Rotating Beacon Light Switch.** The beacon light is mounted on the front underside of the aircraft, forward of the bomb bay. Due to the way FSX handles lights, it causes distracting flashing in the cockpit at night and so has been disabled in the aircraft.cfg. If this is not an issue to the user, or only daytime flying is planned, then the two forward slashes '/' should be removed from its line in the [Lights] section of the Savage's aircraft.cfg.
- 2) **Windshield Wiper Switch.** The simulation only has one speed.
- 3) **Armrests.** Click with the mouse to raise or lower. The left and right armrests can be moved separately.
- 4) **Fire Warning Panel Test Switch.** Click and hold the switch the mouse to test the Engine Fire Warning lamps.
- 5) **Oil Cooler Flaps Switches.** Open/close the flaps on the underside of each of the reciprocating engines.
- 6) **Cabin Pressure Altitude Indicator.**
- 7) **Outside Air Temp. Indicator.** The mouse tooltip displays the temperature in both Centigrade and Fahrenheit.

8) **Hydraulic Pressure Indicator.** Displays the pressure of the main hydraulics and controls boost system.

9) **Pitot Heater Switch.**

9) **Hydraulic Pressure Indicator.** Displays the pressure of the main hydraulics and controls boost system.

10) **Fire Warning Panel.** In the event of an engine fire, the appropriate lamp will illuminate here as well as flashing the master fire warning lamp on the main instrument panel.

11) **Intercooler Flaps Switches.** Use to open/close the turbo intercooler flaps on the sides of each of the reciprocating engines.

12) **Fire Extinguisher Panel.** This sub-panel has, for each engine, a toggle switch which enables the extinguisher, and a red push button to activate the extinguisher itself. Pressing the extinguisher button will also shut the fuel valve and stop the engine.

13) **Engine Start / Shutdown Panel.** This sub-panel has, for each engine, a toggle switch which opens or closes the main fuel valve to that engine. The small silver push buttons are used to start the engine.

14) **Electrics Panel.** This sub-panel has various switches which operate the following systems :

Cabin Flood Light Switch. Provides general red illumination for the cockpit.

Panel Lights Switch. Toggles the lighting for the instruments and panel descriptive text.

Mainwheels Anti-Skid Switch. Prevents mainwheel lockup on braking.

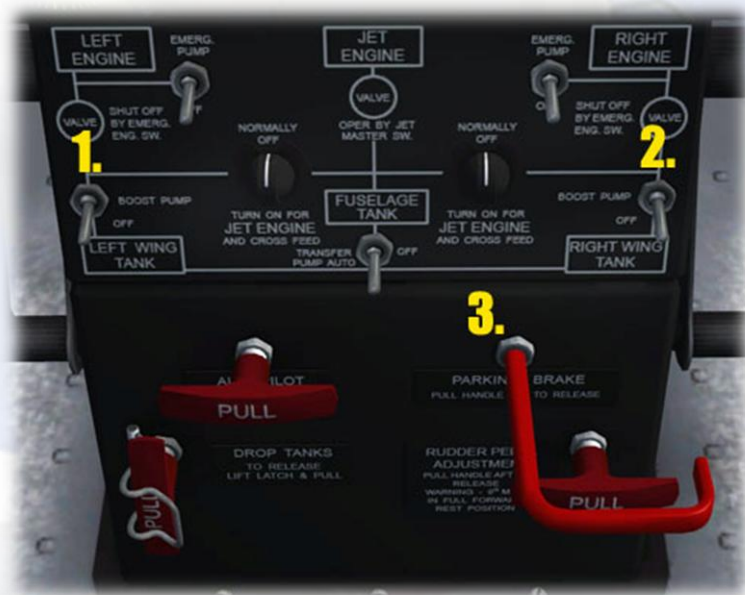
Master Battery Switch.

Nav Lights Switch.

NAV-GPS. Toggles NAV1 and GPS to drive the autopilot.

Engine Anti-Icing Switches. These are the 'carb. heaters' for the reciprocating engines.

PILOTS LOWER PANEL



- 1) Fuel Boost Pump, Engine 1.
- 2) Fuel Boost Pump, Engine 2.
- 3) Parking Brake Lever.

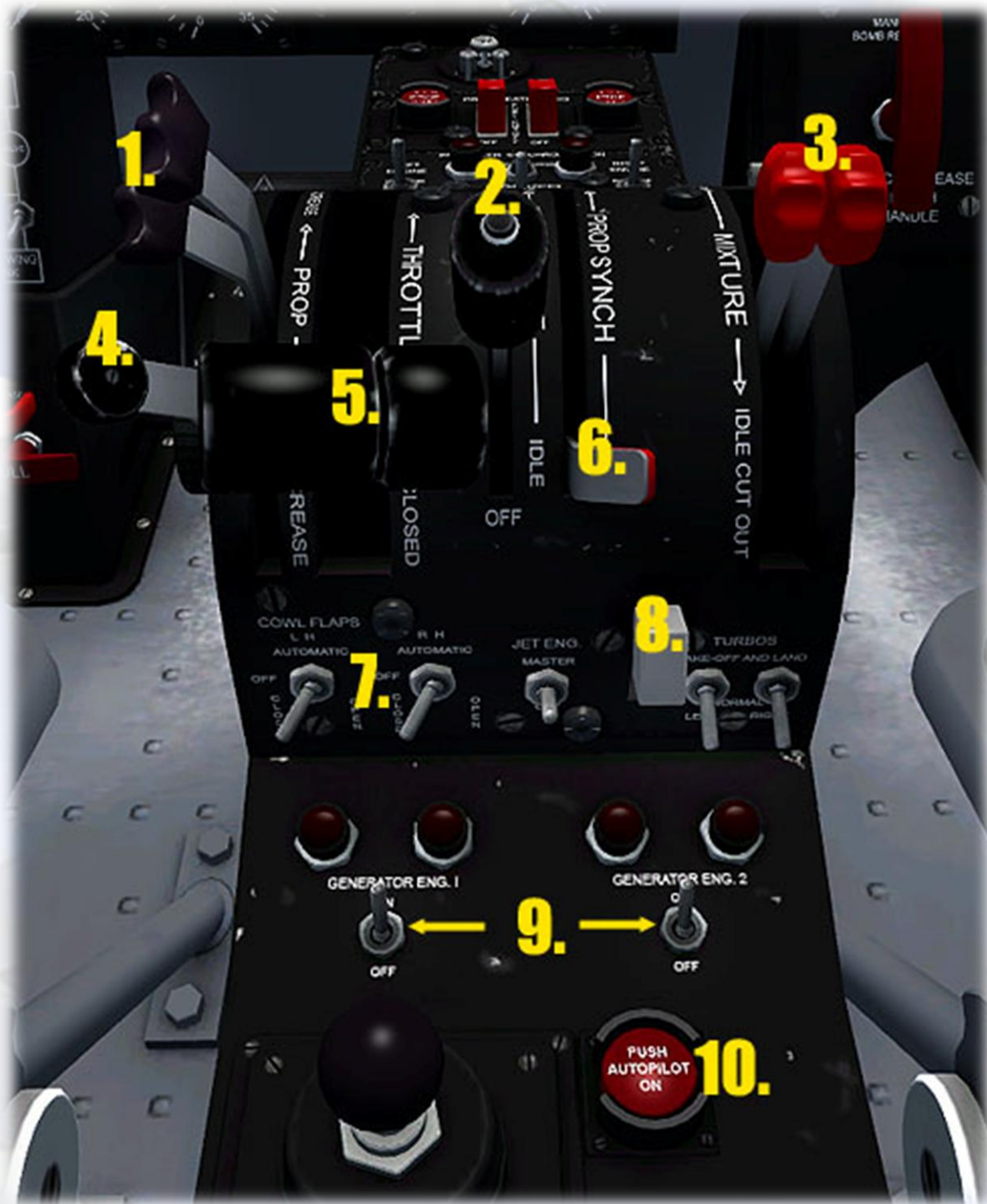
CENTER CONSOLE • FWD



- 1) **Magnetos / Ignition Switches.**
Disabled due to crash issue with jet/prop hybrid flight model.

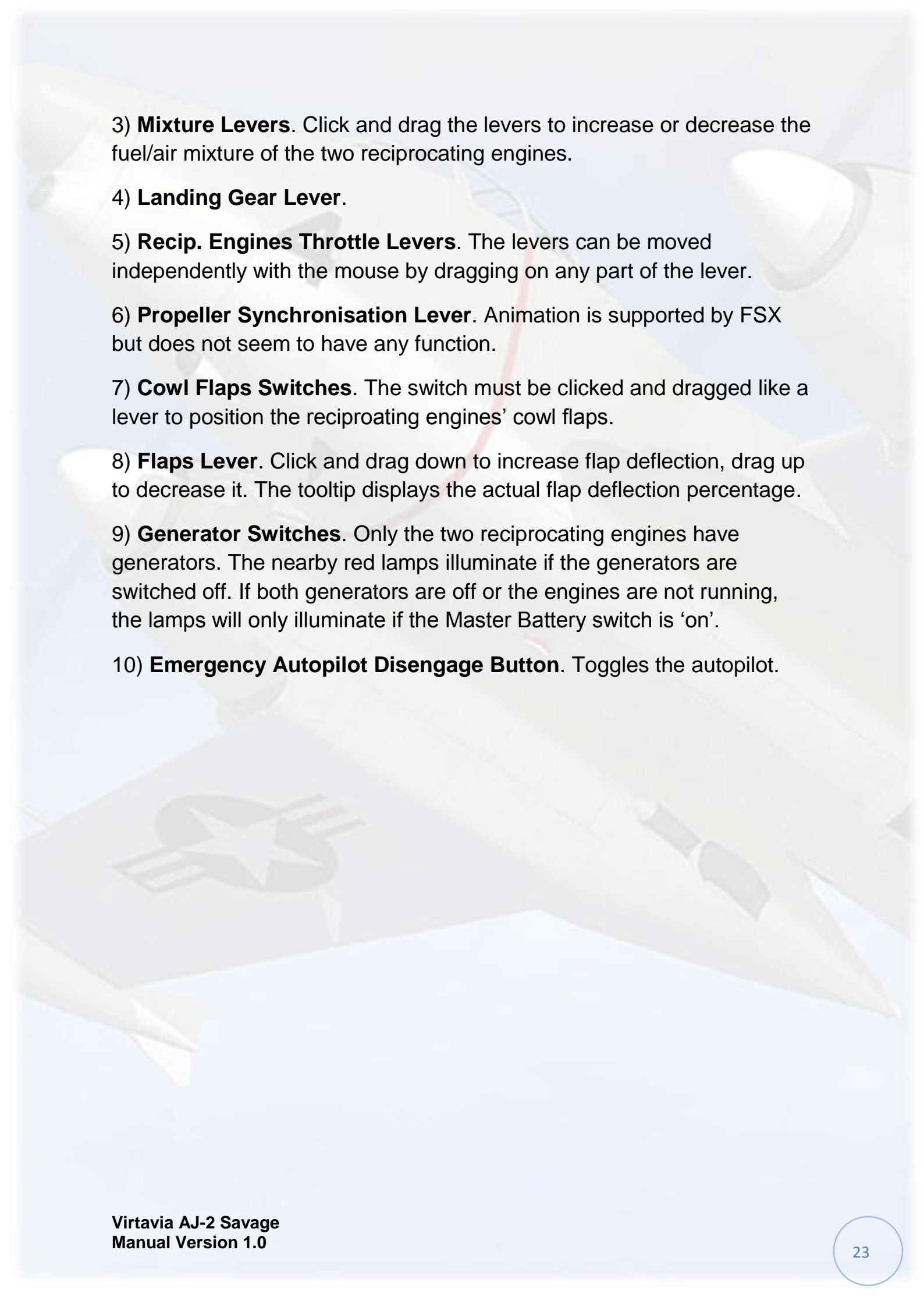
- 2) **Prop Feathering Panel.**
Pressing the button will set the propeller blades edge-on into the slipstream. NOTE – blades must be at fully coarse (max.) pitch before they can appear fully feathered on the exterior model. The engine should be stopped before feathering.

CENTER CONSOLE • AFT



1) **Propeller Pitch Levers.** Click and drag the levers to increase or decrease the pitch of the propeller blades.

2) **Turbine Throttle Lever.** Click and drag the lever to increase or decrease the RPM of the jet turbine engine.



3) **Mixture Levers.** Click and drag the levers to increase or decrease the fuel/air mixture of the two reciprocating engines.

4) **Landing Gear Lever.**

5) **Recip. Engines Throttle Levers.** The levers can be moved independently with the mouse by dragging on any part of the lever.

6) **Propeller Synchronisation Lever.** Animation is supported by FSX but does not seem to have any function.

7) **Cowl Flaps Switches.** The switch must be clicked and dragged like a lever to position the reciprocating engines' cowl flaps.

8) **Flaps Lever.** Click and drag down to increase flap deflection, drag up to decrease it. The tooltip displays the actual flap deflection percentage.

9) **Generator Switches.** Only the two reciprocating engines have generators. The nearby red lamps illuminate if the generators are switched off. If both generators are off or the engines are not running, the lamps will only illuminate if the Master Battery switch is 'on'.

10) **Emergency Autopilot Disengage Button.** Toggles the autopilot.

REFERENCE INFORMATION

Virtavia AJ-2 Savage Procedures

Location of Starter and Lights Switches

The starter and lights switches are located at the pilot's left side console. Mouse over each switch to confirm its function.

Starting Engines

Use Ctrl-E (autostart) to start the aircraft, or:

1. Check Cowl Flaps FULLY OPEN.
2. Check Oil Cooler Flaps are CLOSED.
3. Check Intercooler Flaps are CLOSED.
4. Check Bomb Bay Doors are CLOSED.
5. Check Crew Entrance Hatch is CLOSED.
6. Check Anti-Ice switches are OFF.
7. Check Generator Switches are ON.
8. Set throttles to IDLE.
9. Check Mixture Levers at Fully Rich position (fully fwd).
10. Check Fuel Valve Switches in OPEN position.
11. Set Master Ignition switch to ON.
12. Check both Magneto switches are set at 'BOTH' (pointing aft).
13. Check Pitot Heat switch is OFF.
14. Check Prop Pitch Levers at fully FINE.
15. Set Master Battery switch ON.
16. Set Navigation Lights switches to ON.
17. Check Parking Brake ON.
18. Start Engine 1 using the engine start switch.
19. Monitor engine RPM. Check that engine has not failed to start (caused by not leaving the switch on START long enough). Repeat for engine 2 (and engine 3 (jet) if required).
20. Check temperatures & pressures.

Taxi

1. Check Window Hatch SHUT.
2. Set Parking Brake OFF.
3. Advance throttles to begin taxiing.

Takeoff

1. This section assumes maximum fuel load in all tanks.
2. Check Autopilot OFF.
3. Set Pitot Heat ON.
4. Set flaps to takeoff (normal 25 %, 100 % if catapult launched).
5. Set nose-up Pitch Trim as required.
6. Set Prop Pitch COARSE (default FSX setting, ctrl-F4 if needed).
7. Apply power smoothly to full throttle.
8. Take off occurs at approx. 80 KTS IAS.

After Takeoff

1. At 120 KTS raise GEAR.
2. At 140 KTS raise FLAPS.
3. Set Cowl Flaps CLOSED.
4. Set Oil Cooler Flaps OPEN.
5. Shut down Jet Engine (if required).
6. Allow the aircraft to accelerate to the best climb speed.

Cruising

1. Level off at desired cruise altitude.
2. Reduce throttle setting.
3. Adjust speed to cruise at 240 KTS.
4. Use autopilot to set cruise parameters.

Descent

1. Begin descent 40 miles from the airfield.
2. Check Pitot Heat ON.
3. Set Cowl Flaps 1/2 OPEN.
4. Set descent rate and speed as desired using the autopilot.

Approach

1. Set Autopilot OFF.
2. Set Altimeter Baro Pressure to match landing zone pressure.
3. Enter downwind leg at 175 KTS.
4. Lower Landing Gear.
5. Set Flaps to 25%.
6. Lower Arresting Hook (if required).

Landing

1. Check Autopilot is OFF.
2. Maintain 115 KTS.
3. Set FLAPS FULLY DOWN.
4. Adjust throttles to compensate for drag.
5. Visual check airfield / deck is safe for landing.
6. Touchdown speed is 100 KTS.

After Landing

1. Flaps FULLY UP.
2. Set Cowl Flaps to FULLY OPEN.
3. Set Arresting Hook UP (if required).

Shutdown

1. Stop engines using Fuel Valve Switches.
2. Set Magnetos and Master Ignition Switch to OFF.
3. Set Pitot Heat and Navigation Lights to OFF.
4. Set all cockpit and cabin lighting to OFF.
5. Set Generator Switches to OFF.
6. Set Master Battery Switch to OFF.

AJ-2 Savage Specifications and Speed References

Specifications

- Crew: 3
- Engines: 2 x Wright R2800-44W Radials, 1 J-33-A-10 Turbine
- Power: 2,300 s.h.p. each (radials), 4,600 lbs thrust (turbine)
- Wingspan: 71' 5"
- Length: 61' 1"
- Tail Height: 21' 4"
- Empty Weight : 31,900 lbs
- Combat Weight : 46,656 lbs
- MTOW : 51,600 lbs
- Max. Landing Weight : 45,000 lbs (field), 37,500 lbs (arrested)
- Ordnance : optionally 14 x T9E8 unguided bombs, 108 x K112 or 40 x K123 Phtotflash bombs, 1 x nuclear free-fall bomb.

Flight Reference Data

- Maximum speed : 386 kts at 35,000 ft (309 kts A.S.L.)
- Average cruising speed / altitide : 240 kts at 25,000 ft
- Max. Combat Range : 2,365 nautical miles
- Max. Combat Ceiling : 40,500 ft
- Max. Fuel Load : 8,862 lbs
- Max. climb rate at Sea Level : 2,875 ft/min
- Max. climb rate Combat Altitude : 1,825 ft/min (30,000 ft)
- Stalling Speed – power off : 88.4 kts
- Stalling Speed – approach power : 75.6 kts