SAAB J 35J Draken for Microsoft® Flight Simulator 2004

Copyright © 2001–2006 by Thomas Nilsson, Bookmark Digital Graphics
flightsim@bookmark.se

Aircraft version 2.41
Help file version 2.4.002, 2006-03-20

Table of Contents

Introduction

Thank you for downloading our simulation of the SAAB J 35 Draken, the only jet fighter to be in use for more than 50 years! The first J 35 flew in October, 1955. The last to be taken out of service where those of the Austrian Air Force, who held on to their Drakens until November 2005.

This is a complete FS9 package with model, textures, flight dynamics, panel, sounds and effects, everything you need to fly a Swedish Air Force J 35J. No other files are required.

Note: This version will **only** work in Flight Simulator 2004 (FS9).

Visit our website/support forum http://flightsim.bookmark.se for more info and updates!

Installation

Just double-click the installer and follow the on-screen instructions. The installer will automatically locate the path to your main FS9 directory and ask you to either accept it or chose a different path.

The installer program will install all necessary files in the proper locations. If you have duplicate files from a previous version they will be overwritten where necessary. Please note that older versions might not work with newer effects, gauge or sound files.

That's it! You will find the aircraft under manufacturer SAAB in the FS9 aircraft selector.

Read before you fly – how to use this document

I cannot say this too many times: **Read the documentation before you start your first flight!** This is a very realistic and complex simulation, and quite different from most other FS9 aircraft. And, as if that wasn't enough, the instruments and controls are labeled in Swedish. ;o)

A basic set of procedure checklists can be found in the knee pad (default key command: F10) as well as in this document. Read through this help file, follow the procedures, and you will have no trouble starting up, taking off, and coming down in one piece.

The functions and controls are described in no particular order. The procedure checklists are enough to get you started, but the descriptions will give you a better understanding of each part of the aircraft.

The appendices contain additional information, check lists, and a short Swedish/English glossary.

Special fonts, bullets and frames are used to emphasize important information:

Note: This is a valuable tip – not necessarily crucial info, but good to know.

> **!**   This is an **IMPORTANT** instruction. If you ignore it you will eventually run into problems such as equipment malfunction, degraded performance, etc.

> ⚠️ **This is an even more important instruction, a WARNING. Ignoring this instruction might result in loss of control and/or damage to the aircraft.**

Version history

2.41 – March 2006

Essentially version 2.4 but with some minor bug fixes and amendments to the help file.
Released on the Bookmark website as well as on AVSIM, FSCom, Simviation, and a number of other major and minor flightsim websites.

2.4 – March 2006
New engine, new flight dynamics, loadout selection panel, exhaust gas temperature regulator (MTR), exhaust nozzle control (RAT), new navigation system, new radios, etc, etc.
Only released on the Bookmark website.

2.3 – January 2006
An "intermediate" version with many new (or rebuilt) gauges, and some functions that I wanted to try on a smaller audience before releasing on the major sites. Also has lots of changes to the 3D model and textures, so repaints made with the 2.2 repaint kit will not fit...
Only released on the Bookmark website.

2.2 – December 2005
First complete package with original aircraft model, flight dynamics, panel, sounds and effects.
This package also contained a repaint kit in Photoshop format.
Released on the Bookmark website, AVSIM and FSCom.

2.1 – June 2005
Version 2.0 minus some bugs, plus effects files.
Only released on the Bookmark website.

2.0 – March 2005
Instrument panel, sounds, and flight dynamics for FS2004. All gauges re-coded in XML.
Released on the Bookmark website, AVSIM and FSCom.

1.2 – May 2002
Final version of the panel and flight dynamics for FS2002.
Released on AVSIM and FSCom.

1.1 – April 2002
Internal version, never released.

1.0 – April 2002
Instrument panel and flight dynamics for FS2002. No external model or sounds.
Released on AVSIM and FSCom.

Description

The model is made in GMAX and has approximately 35000 polygons including the VC. It is modeled from SAAB and Swedish Air Force blueprints, drawings, manuals, and lots of photos.

Some of the features

- Realistic hydraulic and electrical systems

- Working afterburner with sound and visual fx

- Animated, fully functional Emergency Power Unit

- Animated drop tanks

- Working drag chute

- Animated exhaust nozzle (eylids)

- Loadout configuration panel

- "Last state" config file – when you exit the simulation, the position of most switches and dials will be saved and loaded with the aircraft.

Virtual Cockpit

Some switches and controls are hard to find and operate in the Virtual Cockpit, simply because of the general clutter in the small cockpit. I have made some compromises in the VC to allow for better functionality, such as removing the joystick and radar control handles. But some instruments and controls are still obscured in the VC, so the Cockpit View (2D panel) is still the best environment for flying this aircraft. A matter of taste perhaps.

Textures

The two included texture variants are both from the 10th wing of the Swedish Air Force (F10) in Ängelholm, Sweden. A layered repaint kit in Photoshop 7 format is included in this archive. Feel free to create and distribute you own textures, but remember to include proper credits.

Effects

The afterburner flame and smoke effects are triggered by "invisible" gauges on the instrument panel. This means that they will only work if you have loaded the panel at least once by switching to Cockpit View or Virtual Cockpit View. After that, they will work in any view.

The high altitude contrail effect will show up below -30˚C. Smaller wingtip contrails will appear at high G and low altitude.

Sounds

The engine sounds (including the start-up and shut-down sequences) are stereo recordings of a Volvo Flygmotor **RM6B** engine, a license-built Rolls-Royce Avon Mk 48A with a Swedish afterburner used in J 35A/B and in A 32 Lansen. The J 35D/F/J had the **RM6C**, which is the more powerful Avon Mk 60 with an uprated afterburner. Basically the same engine though, and they sound almost the same.

The panel sounds and afterburner sound are controlled by a special gauge (dsd_xml_sound3.gau). This gauge (and the gauge that saves the panel state) is made by Douglas Dawson and included in this package with his kind permission.

Flight Dynamics

The FD (.air) file is the result of more than 18 months of trial-and-error by me and a number of Swedish Air Force J 35 pilots. It is fairly accurate, but not perfect. If you have experience flying the real J 35 you are most welcome to contact me and suggest changes.

Special features and key commands

Afterburner

The afterburner is activated with the standard FS9 **Reheater/Afterburner** key command. The default key command is Shift-F4. If you cannot get the afterburner working, check your key assignments.

You will definitely know if it **is** working: the engine sound changes (whoom), and an indicator text REHEATER ON is shown on the status display in cockpit view. In exterior view you will see a flame and some exhaust smoke, you can also see the exhaust eylids open up slightly.

The afterburner indicator light (EBK) on the Annunciator Panel should light up briefly (2-3 seconds) when the exhaust eylids move. Please note that this light is **not** an indicator for afterburner on/off!

If the RAT function is switched on, the indicator light will show a steady light when the aircraft is on the ground and throttle is at ground idle. See RAT function.

The following criteria must be fulfilled to ignite the afterburner:

- Throttle >95%

- Reheater fuel valve open (**LT EBK** on the [Engine Panel](#))

> **!** The afterburner fx are triggered from a gauge on the instrument panel. If you are in spot view in another aircraft, and then switch to the J 35, *you have to load the instrument panel at least once by switching to cockpit view* – otherwise the afterburner (and a number of other things) will simply not work.

Drop Tanks

The two external tanks can be released with the FS9 **Release Drop Tanks** key command. The default key command is Shift-D, but check your key assignments if it doesn't work.

Note: it takes two keystrokes to drop the tanks: first click unlocks the mechanism, second click releases the tanks.

Drag Chute

The chute is operated with the **Increase Flaps Incrementally** key command. It cycles between three states: Stored, Deployed, and Released. The first click will deploy the chute, second click will drop it. The third click will reset the chute and close the hatches (not realistic but very handy in FS9). Hitting **Decrease Flaps Incrementally** will also reset the chute.

The chute will tear and disappear above 350 km/h.

Note: The chute lever can only be operated if throttle is below 89 %.

Canopy

The canopy can be opened with the usual key command for exits, Shift-E is default.

Opening the canopy in mid-air is generally a bad idea. At higher altitudes you will lose cabin pressure (and the canopy itself, at any altitude) and the Cabin Pressure warning light will light up.

Loadout configuration

You can choose between three different Sidewinder models and two Falcon AAMs on the very handy **Loadout Config Panel**. None of them can be launched, sorry...

Show/hide the Loadout panel by clicking on this icon (in cockpit view):

Flying the J 35

The J 35 has lots of personality and is a challenge to master. It is genuinely fun to fly if you follow procedures and use common sense, but it needs constant input and a firm but delicate hand. If you lose control you are definitely up the creek without the proverbial paddle.

Draken is a child of the cold war period and was originally intended as a high-altitude interceptor, to counter the MiGs of the era. Its real strength was eventually to be found in low-and-fast attack runs.

Although you will never reach the much-advertised Mach 2, acceleration on afterburner is fierce, and you can easily overspeed on take-off. On the downside, speed bleeds off just as fast when you throttle down, and with rising angle of attack. Keep your eye on the AOA meter all the time; above 18 degrees alpha you will lose speed very quickly and end up in *superstall*. The big delta wing does not stall gradually like a conventional wing, it will lose all lift suddenly and turn you into a flying brickyard.

In the transsonic range the plane will be hard to maneouvre at low altitude; the big elevons will be sluggish because of the high dynamic pressure. Above 0.95 Mach you will not be able to pull more than 3-4 Gs. This is one of the more "interesting" characteristics of the Draken.

When using the afterburner, you will burn fuel at an alarming rate. At lower altitudes there is also the risk of overheating. Watch the EGT meter, never exceed 770˚C. The Max Temp Regulator will reduce throttle automatically to prevent overheating (if enabled).

Landing is tricky because of the high nose attitude and lousy forward view. Go for a long and straight final at 290–300 kmh and 12 degrees AOA with gear down and air brakes deployed. Aim for the far end of the runway, and touch down at 270 kmh *minimum*. After TD, keep the nose up for aerodynamic braking as long as possible. Use the drag chute if you are heavy or on a short runway.

> ⚠ **Be very careful below 325 kmh! If you pull up you will stall very easily, with little chance of recovery. If you have *any* doubts about your ability to land safely – GO AROUND. Set full throttle and retract speed brakes immediately, then retract gear as soon as you start to accelerate.**

Getting started

**Use the procedure checklists!**

This is a very realistic and complex simulation, and in many ways very different from other FS9 aircraft. The checklists will help you to successfully start up, fly, and land the J 35J.

For realism, I suggest a "cold start" with the engine and all systems switched off. *This is the default state when you first load the aircraft.*

Starting the engine

Before the battery bus is switched on, only the LT and FT warning lights on the Engine Panel should be lit. The Engine Panel is tied to the hot battery bus (before the main switch).

1. Switch on the battery bus. Remember: TILL means ON, FRÅN means OFF.
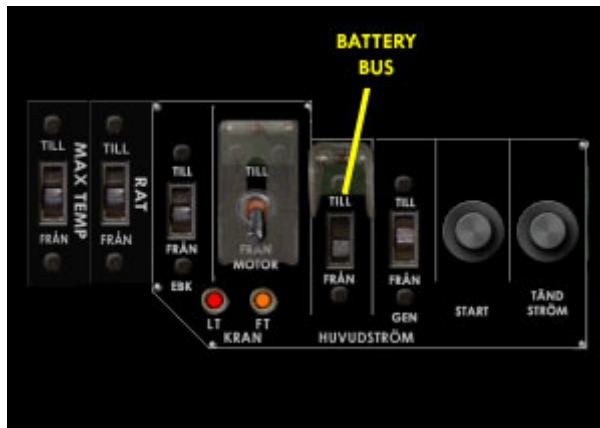
A number of warnings lights wll light up on the Annunciator Panel, and the Master Warning Light will flash:


The gear indicator should show three or four green lights. The fourth (spur wheel) indicator light will only be lit if there is pressure left in the hydraulic system.

2. Set the Fuel Mode Switch to FRÅN (off). This will close the drop tank fuel valves.

3. Switch on the Main Fuel Valve and the Reheater Fuel Valve. Check that the LT warning light is OFF and the FT warning light is ON:
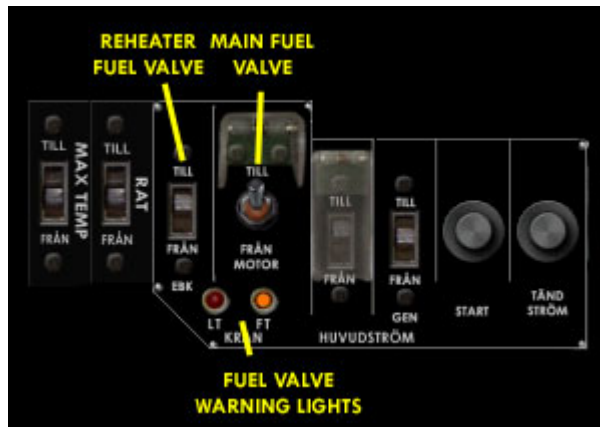
4. Press and hold the START pushbutton for 2 seconds. The oil and hyd pressure warnings should disappear one by one as the engine spools up, and the fourth gear indicator light (spur wheel) should now be lit.
   Two warning lights should remain, indicating that AC power is not yet available:

5. When engine rpm is > 30%, switch on the alternator (press and hold GEN Switch for 2 sec).
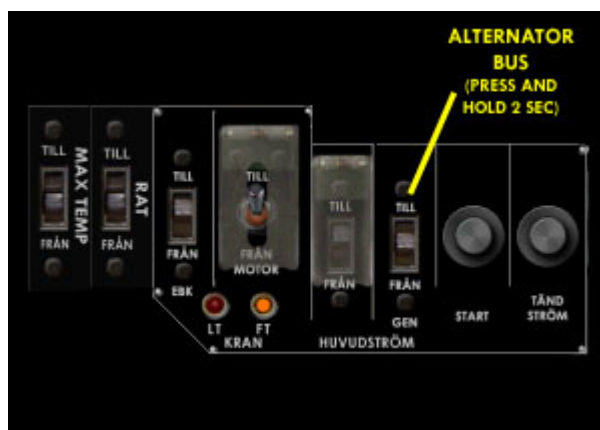
All warning lights on the Annunciator Panel should now be off.

6. Set the Fuel Mode Switch to TILL (on). This will open the external (drop) tank fuel valves. Check that the FT warning light on the Engine Panel is no longer lit.
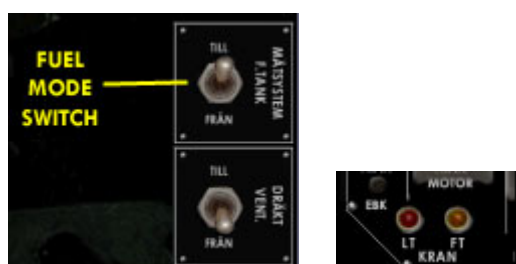
The Instrument Panel
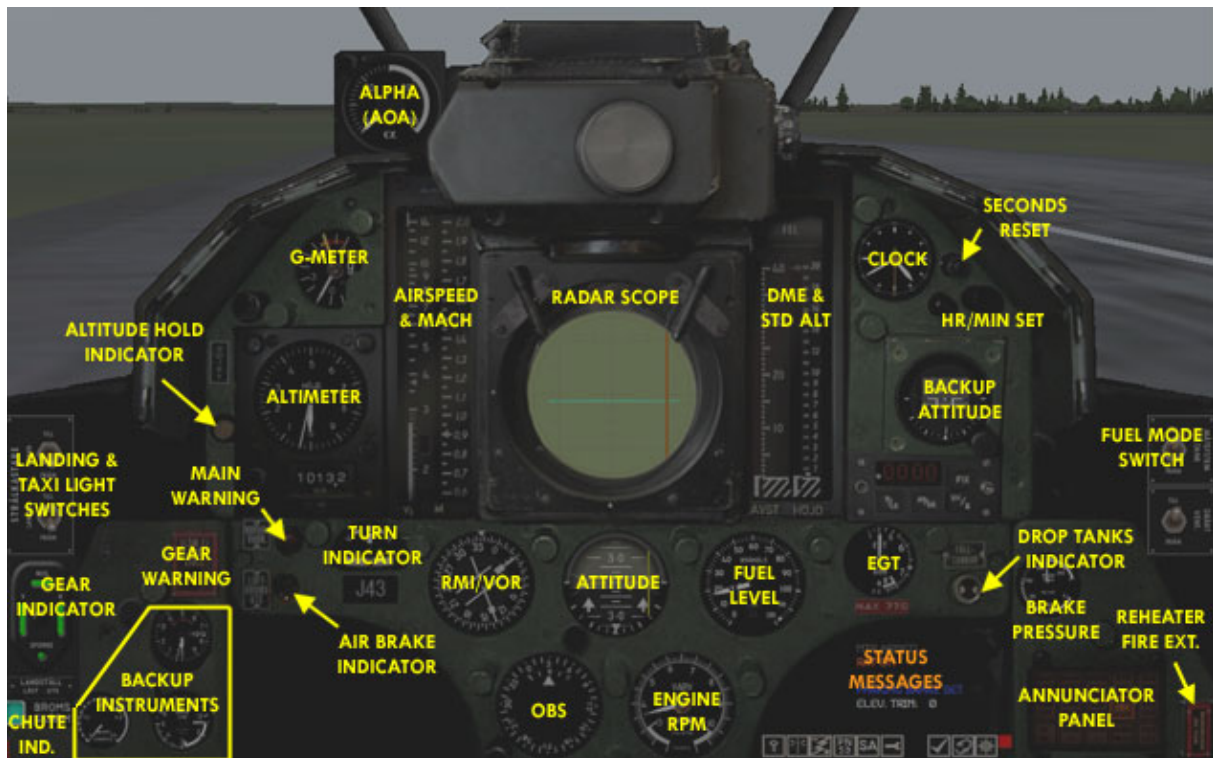
If you are uncomfortable with metric units, check the tooltips (move the cursor over each instrument). The tooltips will present most readings in both metric and US units.

Altimeter and barometer setting
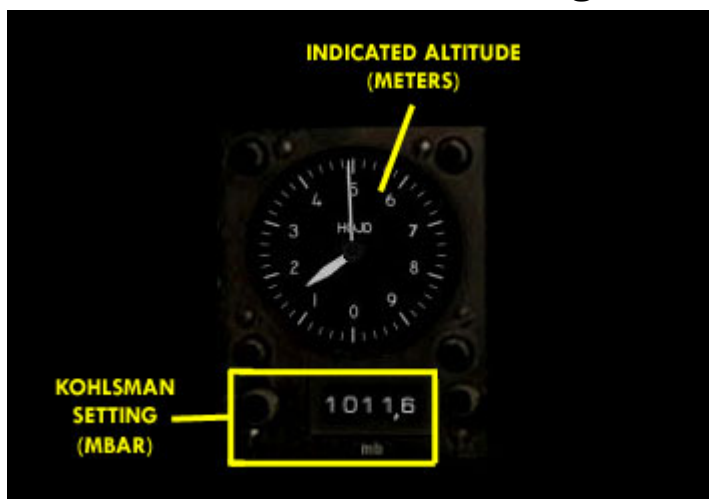
The altimeter shows the altitude in meters. And yes, it is confusing that it's upside-down, but you will get used to it. ;o)

The barometer setting is in millibars (hPa). 1 Atm = 1013.25 mb = 760 Hg.

Airspeed / Mach
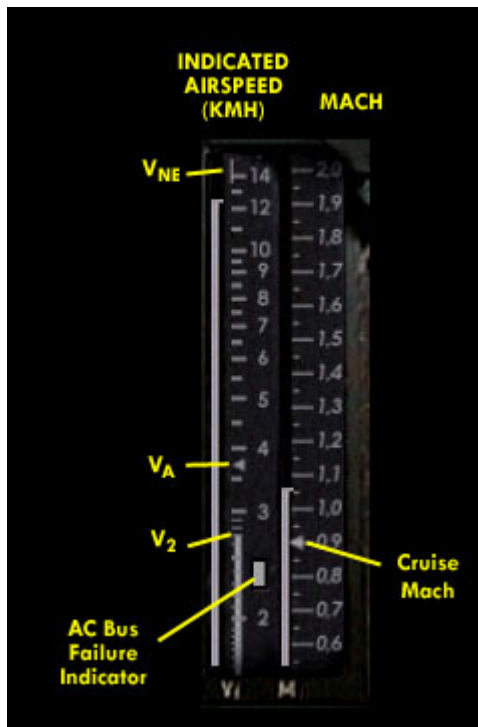
The left tape shows indicated airspeed in kilometers/hour. The right tape shows Mach number. As with most other instruments, the tooltip shows the reading in both metric and US units.

The small white rectangle indicates AC bus failure, it appears if/when alternator voltage is below 24 V.

DME Distance and STD Altimeter
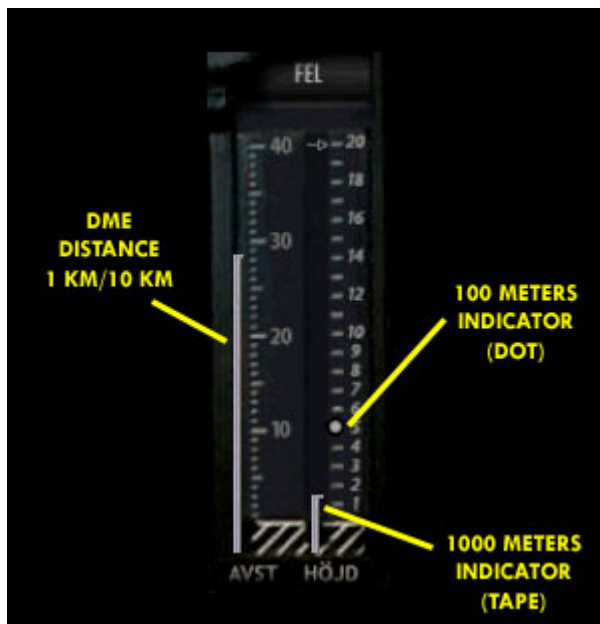
The left scale shows DME distance in ranges 0–40 km or 0–400 km, depending on the setting of the FD Mode Selector on the PN59 Panel . The tooltip also shows the distance in nautical miles.

The right scale shows the standard pressure altitude at 1013.25 hPa (QNE). The bar indicates thousands, the dot hundreds of meters. The tooltip also shows the value in feet.

The small arrow shows target altitude. It is disabled in this version.

Radio Stack
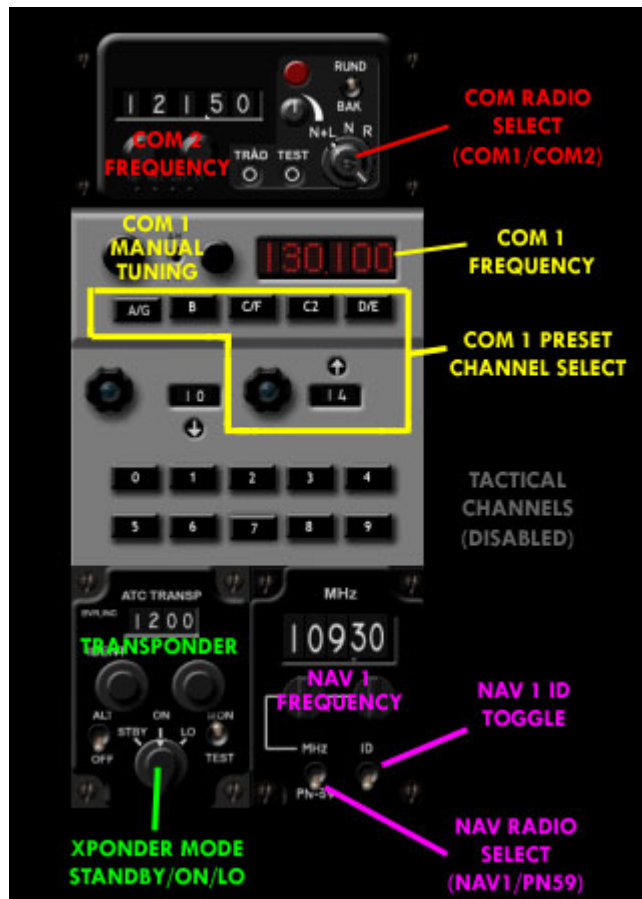
Note: The radio stack is not entirely authentic because of the limitations in FS9.

> **!**   The frequency setting method in the NAV and COM radios is different from the standard FS2004 system, to allow for greater realism (preset channels, etc). The downside of this is that **automatic tuning in ATC will not work**, and you can not set frequencies from your keyboard. Sorry!

Backup Com Radio/COM 2

The topmost panel is used to set frequencies for the backup radio, COM2. It also functions as a Com Radio Selector with three settings:

N+L   COM 1 active + listening on emergency freq 121.50 (default)
N   COM 1 active
R   COM 2 active

The red light indicates COM1/COM2 radio failure.

RUND/BAK is an antenna selector. It has no function in this version.

TEST will trigger a 1 KHz test signal. TRÅD is for ground communication, not used here.

Com Radio/COM 1

The big grey panel is the normal radio (COM1) control panel. It has 350 preset frequencies that are selected with five alphabetic keys and a dial (marked yellow in the picture above). See Appendix 1 for a list of channel codes and frequencies. The frequency can of course also be set manually, which will override the presets. Either way, the selected frequency is shown on a LED display.

The numerical keys on the lower half of the grey panel are used for selecting tactical radio channels, *STRIL (*disabled in this version).

Nav Radio

The Nav Radio panel is not authentic, as there is no "standard" VHF navigation radio in the Swedish J 35 versions. I added this panel for compatibility with FS 2004. It has two modes:

MHZ   Manual tuning of NAV 1 (default)

PN-59   PN-59 navigation system used, see PN-59 Navigation Panel.

The Flight Director (crossbars on Radarscope and Attitude Indicator) will behave differently depending on which mode is selected. In manual mode (MHZ) it acts as the standard FD in FS2004, showing localizer and glide slope deviation. In PN-59 mode, it is a bit more complicated.
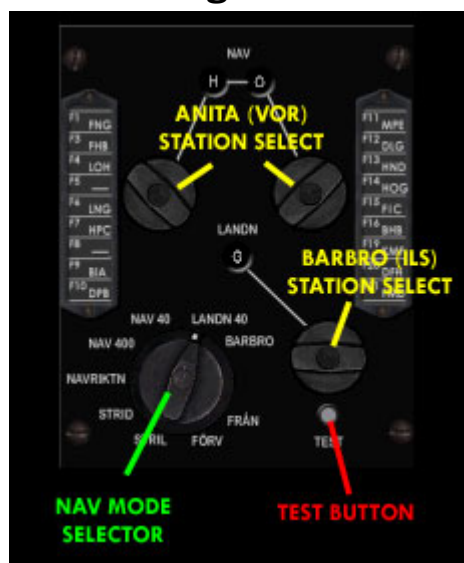
See PN-59 Navigation Panel for more information on how to use the Flight Director.

ATC Transponder

The Transponder can be set in STANDBY, ON or LO mode. ON is the default mode, STANDBY means transponder off. LO has no function here.

The other toggle switches have no function in this version, they are just eyecandy.

PN-59 Navigation Panel

The PN-59 panel selects presentation mode and range for the Flight Director and DME indicator, and also selects channels for the PN-59 Navigation Radar system (see below).

The Flight Director has eight modes:

FRÅN	OFF
FÖRV	STAND BY
STRIL/STRID	TARGET DATA (disabled)
NAVRIKTN	VOR
NAV400	VOR/DME range 0-400 km
NAV40	VOR/DME range 0-40 km
LANDN40	ILS with plotted intercept path
BARBRO	ILS

LANDN 40 will help you intercept the LLZ, you simply keep the vertical crossbar of the Flight Director centered until you are lined up on final and have glide slope info.

> **!** My version of LANDN 40 is still experimental and may sometimes give false readings. When you are lined up, switch to BARBRO (ILS) for better precision.

Note: Glide slope information is only available in modes LANDN 40 and BARBRO.

PN-59 Navigation Radar

If you set the Nav Radio Selector (see Radio Stack) to **PN-59** the manual frequency selector is disabled, and navaid tuning is handled by the PN-59 panel. The first two alphabetical dials select a preset ANITA (VOR) station, the third selects a BARBRO (ILS) station. See Appendix 2 for a complete table of codes, stations and frequencies.

The system is fully functional (in Sweden) but will have little practical use unless you have installed and activated the Swedish Military Navaids scenery.

Test mode

The TEST pushbutton will override the current mode and center the vertical Flight Director crossbars on the radarscope and attitude indicator.

Autopilot panel

The autopilot in J 35J is **quite** different from the standard FS9 autopilot. To begin with, the master switch is sealed in the ON position, and should only be switched off in an emergency. You fly manually in the default mode DÄMPN, and the other two modes (HÖJD, ATT) use custom functions for altitude and attitude hold.

The autopilot has three (mutually exclusive) modes:

HÖJD = Altitude hold. When selected, the aircraft will stay at the current altitude with wings level. Use Turn Setting to bank left/right in 15 degree increments.

In this mode, the Altitude Hold Warning Light will flash until the aircraft is stabilized on altitude, then it will show a steady light.

ATT = Attitude hold. The Pitch Adjust lever will adjust pitch up/down in 1 degree increments and Turn Setting sets bank left/right in 15 deg increments.

DÄMPN = Pitch damping. Default mode, always on in manual flight to prevent oscillation in pitch.

The trim adjustment knobs ROLL and GIR (yaw) are disabled in this version.

Override

Moving the stick in HÖJD or ATT modes will switch the autopilot to DÄMPN mode.

Altitude hold is disabled in the transsonic range (0.95–1.05 M) and at >4 G or <-0.5 G. The autopilot will automatically switch to ATT or DÄMPN mode, and the Altitude Hold Warning Light flashes.

The high/low G autopilot override function can be tested by pushing a test switch on the right side console (PROV ACC BRYT).

Caging the attitude indicators will switch off HÖJD and ATT modes.

Note:　Your key command for Autopilot master on/off will **not** disconnect the autopilot, it will only switch to the default mode (DÄMPN). The only way to switch off the autopilot completely is to click on the Master Switch on the Autopilot Panel.

Electrical panel
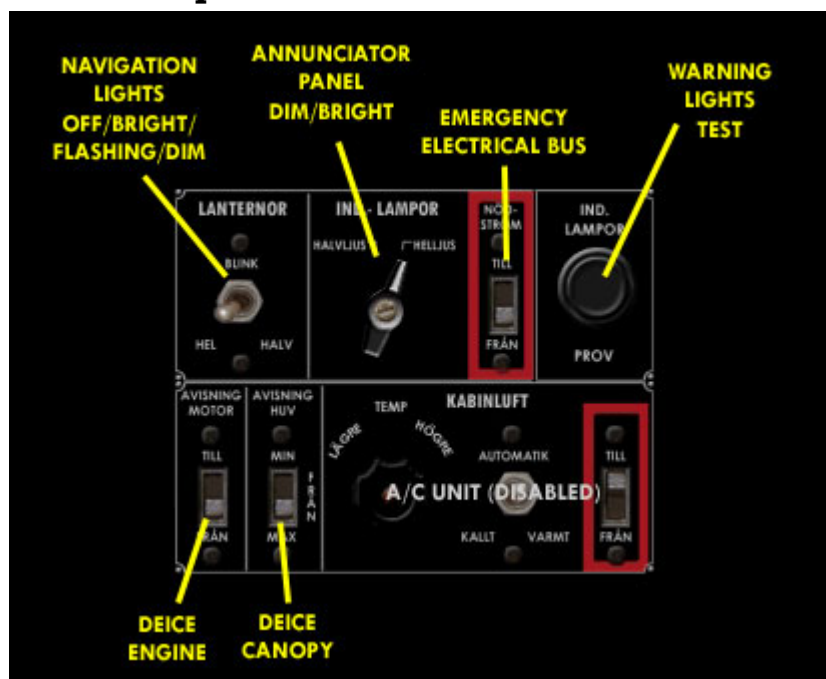
The Navigation Lights are operated by a four-way switch. Center position is OFF, HEL means bright, HALV means dimmed, BLINK means flashing.

The Annunciator Panel can be dimmed for night flying. HALVLJUS means dimmed.

All warning lights will light up when the Warning Lights Test pushbutton is pressed.

The Emergency Electrical Bus switch ties the [Emergency Power Unit](#) alternator to the main bus. Toggling the switch will also manually extend/retract the EPU.

De-icing switches for engine and canopy have the usual functions. The canopy de-ice switch has three positions with OFF in the middle.

Pitot Heating is on the circuit breaker panel, only visible in the Virtual Cockpit.

The climate controls have no function in this version.

Electrical system specs:

Alternator:	200 VAC / 400 Hz / 20 kVA
Emergency alternator	200 VAC / 400 Hz / 3.5 kVA
Max power consumption:	12 kVA
Battery bus:	24-29 VDC
Main AC bus:	29 VAC
Main DC bus:	29 VDC
Secondary DC buses A-C:	29 VDC
Instrument bus:	45 VAC

Circuit Breakers (Virtual Cockpit only)
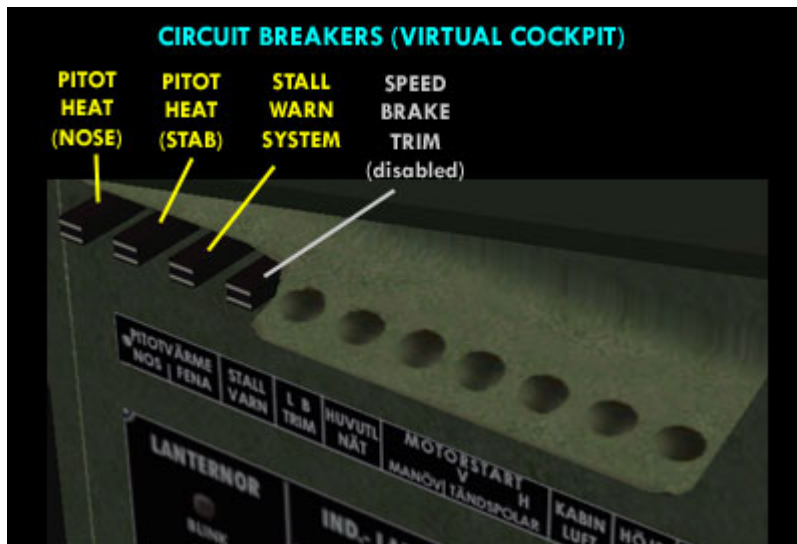
The circuit breaker panel is only visible in Virtual Cockpit view. The first four circuit breakers are used as switches for pitot heating, and for the stall warning and speed brake trim systems. All circuit breakers should be ON in flight.

UP means **ON**.

> **!** The Stall Warning alarm will not sound if the circuit breaker is off. Always check the position of the circuit breakers before take-off.

Speed Brake Trim (LB-TRIM) connects the speed brakes to work in conjunction with the elevons, to counter the effects of high dynamic pressure on the elevons. It is not functional in this version.

Engine and starter panels
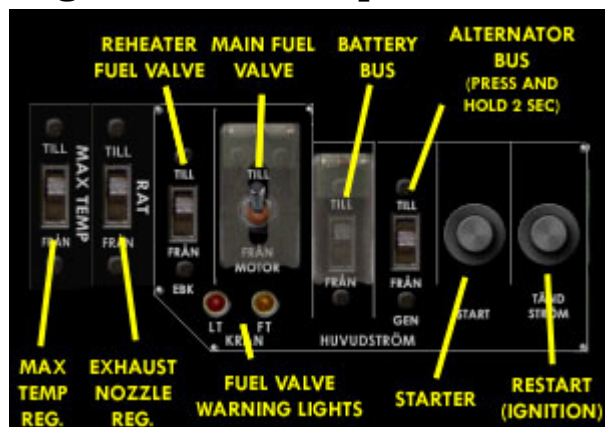
The [Getting started](#) section in this document has detailed instructions on how to use this panel.

Please note that the afterburner will not work unless the Reheater Fuel Valve (EBK) is ON.

The FT light warns you that the Fuel Mode Switch is OFF, which means that the drop tank fuel valves are closed. See [Fuel system](#).

The Alternator switch is spring-loaded. Wait until engine rpm is >30%, then push UP **and hold** for 1–2 seconds to switch ON. Push DOWN to switch OFF. The alternator bus is automatically switched off if engine rpm goes below 27%.

MTR and RAT

The Max Temp Regulator (MTR) automatically reduces fuel flow to the engine if the exhaust gas temperature exceeds 750 ˚C.

The Exhaust Nozzle Regulator (RAT) function will open the exhaust nozzle eyelids fully when the aircraft is on the ground and throttle is below Flight Idle (55%), in order to reduce thrust and prevent overheating. Moving the throttle lever past Flight Idle will deactivate RAT.

Note: The EBK warning light will be constantly lit when RAT is active.

Lights panel

Instrument, panel and interior lights are controlled with two rheostats and a toggle switch in the left part of the cockpit. In this panel version, only the Instrument Lights control is functional, and it only has two positions: On/Off.

Better cockpit and instrument illumination is definitely on the wish list for future versions.

Note: In the VC, the instruments will be illuminated whenever *any* light except Landing/Taxi Lights is switched on. This is a bug (or a feature) in FS9. I know there is a workaround for this, but I honestly cannot remember how to do it...

Hydraulic System

The hydraulic system has two pump circuits with 200 bar system pressure (2990 PSI).

Pump 1: Gear, wheel brakes, nozzle, speed brakes, autopilot, elevon and rudder servos.

Pump 2: Nose gear steering, elevon and rudder servos.

Before the engine starts, there is no hydraulic pressure. All control surfaces are inoperable and the elevons point to the ground. When the engine spools up, the elevons will rise slowly to horizontal position and become operable.

The speed brakes (air brakes) are hydraulically operated and will not work before the engine is started.

If hydraulic pressure drops, the Emergency Power Unit will deploy immediately and supply pressure to the control surfaces (provided that there is enough airspeed).

Note:　At ground idle the pumps can not supply enough pressure to fully deflect the elevons. Moving the stick to its end positions will trigger a warning for Hydraulic Failure (HYD II) on the Annunciator Panel, and the Emergency Power Unit will be extended.

Emergency Power Unit

The Emergency Power Unit (EPU) consists of a small ram-air turbine connected to an alternator and a hydraulic pump. The EPU will deploy automatically if/when hydraulic pressure drops. It is retracted as soon as the engine starts.

The EPU makes a lot of noise when the turbine is spinning!

The emergency alternator supplies 3.5 kVA and is tied to the main AC bus by toggling the NÖDSTRÖM (Emergency Power) switch on the Electrical Panel.

Note:　The NÖDSTRÖM switch will also extend the EPU. Make sure that this switch is OFF in normal flight. While the switch is on, the warning light ELFEL is lit on the annunciator panel.

!　The EPU will only supply electrical power if airspeed is sufficiently high to drive the turbine and the NÖDSTRÖM switch is ON!

Fuel system
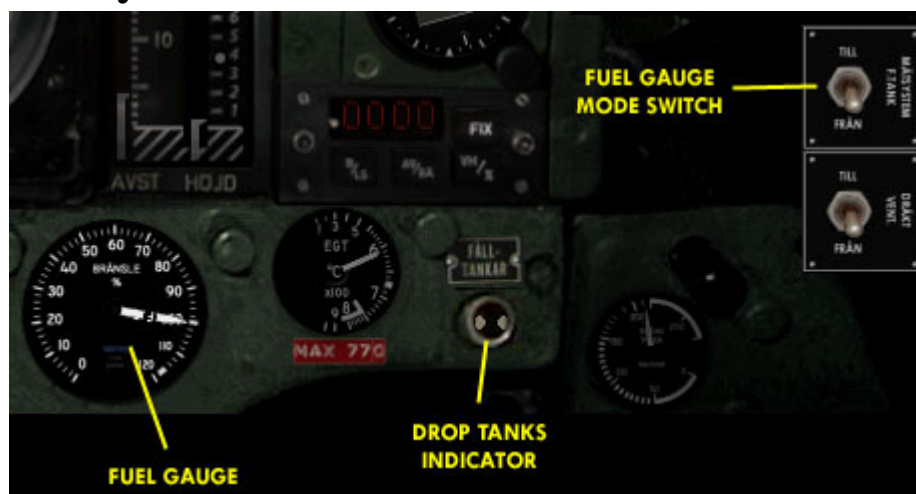
The J 35J has two main sets of tanks, forward and rear, holding 1430 litres each. Four external (drop) tanks with 525 litres each can be added, two under the fuselage and one on each outer wing pylon, giving a maximum of 4960 litres. The default configuration in this model is one pair of drop tanks.

The Forward and Rear tanks are listed as tanks **Center** and **Center 2** in the fuel setup dialog.

The fuel distribution has two modes, selected with a toggle switch on the right side of the cockpit.

When the Fuel Mode switch is FRÅN (OFF), fuel is supplied from the main tanks, and the two fuel gauge needles show the level in forward tanks (F) and rear tanks (B). The needles should not differ more than 5%.

When the Fuel Mode switch is TILL (ON), fuel is supplied from the drop tanks first. The fuel gauge shows the level in the drop tanks, with 40% as maximum. When the drop tanks are empty, a valve closes the drop tanks and opens the main tanks. The fuel gauge will then switch to measuring the main tanks.

> **!** The drop tanks will NOT be connected if the Fuel Mode switch is OFF. This means that the engine will stop when the main tanks are empty, even if there is fuel left in the drop tanks.

The **Drop Tank Indicator** shows two white fields as long as there is fuel in the external tanks.

The drop tanks can be jettisoned with a key command, see Drop Tanks.

Typical fuel consumption:

Ground Idle	140 lit/h (250 lb/h)
Full Military Power (low altitude)	11 000 lit/h (19400 lb/h)
Afterburner	24 000 lit/h (42300 lb/h)

Radar control panel

The only functional controls on this panel so far are the radarscope illumination dimmers. I will try to include a fully working radar in a future version.

Radarscope
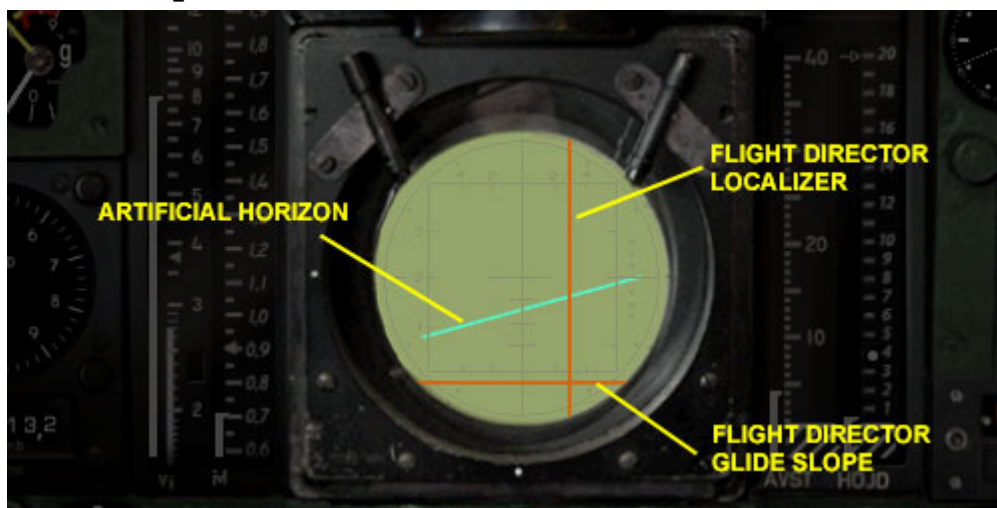
The scope draws an artificial horizon which is slaved to the main gyro. It also has a Flight Director consisting of two mechanically moving bars.

The glass screen has etched grid markings that can be illuminated at night/dusk/dawn. The light intensity of the grid and FD bars is adjusted from the Radar Control Panel (see above).

In real life, the scope of course also shows target information. I am working on a version that will show AI and MU aircraft, but it is a lot of work and I am a lousy/lazy programmer. ;o)

Annunciator/Warning lights panel
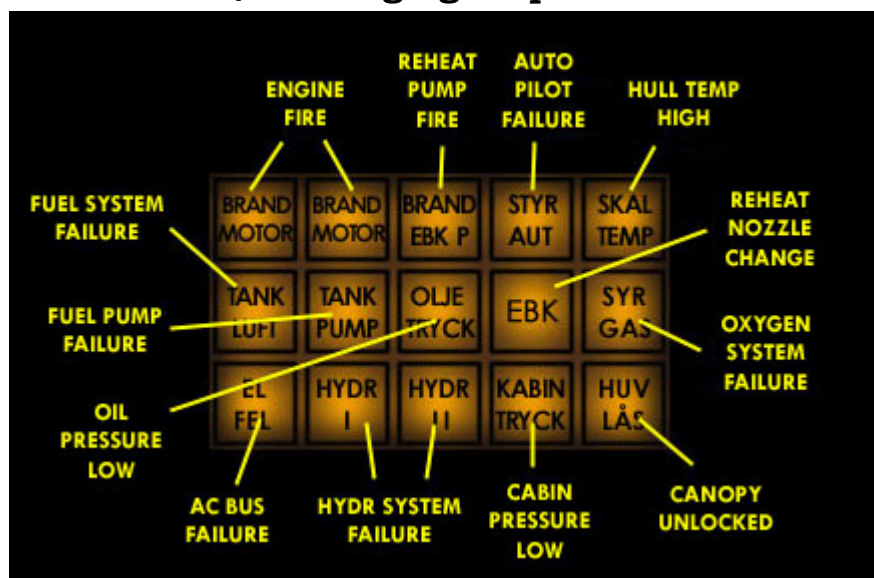
Note: The fire warning lights on the annunciator panel are not functional, as there is no simulation of engine fire in FS9. Maybe in a future version.

Opening the canopy will trigger the Canopy Unlocked warning light. Doing this at high altitude (bad idea) will also trigger the Cabin Pressure light.

The EBK (reheater) warning light should light up briefly (max 2 sec) when the afterburner is ignited or shut off, and show a steady light when the RAT function is active, see MTR and RAT.

The Electrical Panel has a switch for dimming the annunciator panel lights, and a test pushbutton.

Stall Warning System
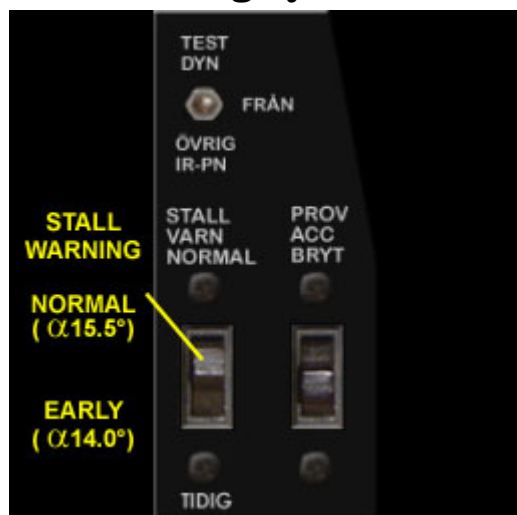
The Stall Warning System has two modes: Normal and Early (TIDIG). In Normal mode, the stall warning alarm will start rattling at 15.5 degrees alpha (angle of attack). In Early mode, at 14 degrees.

The Stall Warning Test button on the left side console (VC only) is not functional in this version.

Oxygen system

The oxygen system supplies a mixture of oxygen and air to the pilot's breath mask. The mixture is automatically controlled depending on cockpit air pressure. At an air pressure corresponding to 9000 meter altitude, the system supplies pure oxygen.

The oxygen system is normally ON, but can be shut off with a valve on the right side console. Switching oxygen OFF will trigger the SYRGAS warning light on the Annunciator Panel.

The Oxygen Pressure Meter indicates the pressure in the oxygen tanks. Should be at least 80 kp/cm^2.
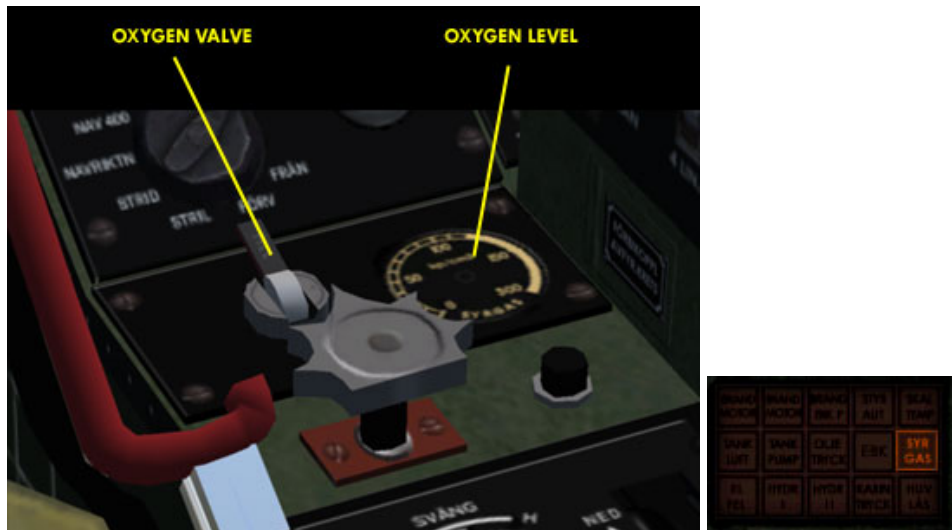
G Meter

The G Meter has a maximum needle that can be reset with a pushbutton.
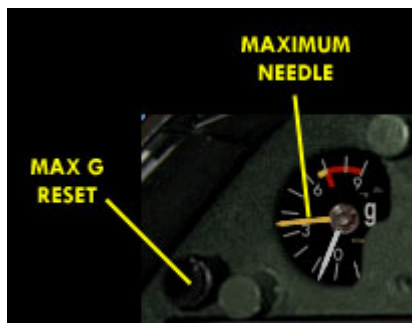
Drag Chute Indicator
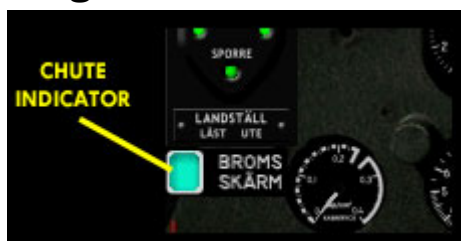
The Drag Chute Indicator has three positions:

GREEN	Chute Ready
BLUE	Chute Deployed
GREY	Chute Released/Dropped

Emergency Procedures

Restart after flameout

1. Press the restart button (TÄNDSTRÖM) for 2 seconds

2. Set throttle to at least high idle

3. Switch Emergency Bus ON (NÖDSTRÖM)

4. Maintain 0.75–0.80 Mach

5. Alternator ON (when engine rpm is above 30 %)

6. Switch Emergency Bus OFF

> **!** If the engine stops, the Emergency Power Unit (EPU) will automatically deploy and supply hydraulic pressure – but electrical power will NOT be available until you toggle the Emergency Bus switch on the Electrical Panel.

Emergency gear operation

Without hydraulic or electrical power, the main and nose gear can still be extended by its own weight, but not retracted again.

1. Extend the gear with the usual key command or the gear lever, and wait for the green lights.

2. Toggle the red lever on the left side console (only visible in the Virtual Cockpit) marked "NÖDLUFT LANDSTÄLL". This will supply compressed air to lock the gear in an extended position.

Swedish Military Navaids Scenery (optional)

For those of you who want to use the original PN-59 navigation system, there is an optional scenery file that will add the military navaids in Sweden to Flight Simulator 2004. This scenery is installed in the Addon Scenery folder but has to be activated through the FS9 Scenery Library dialog.

Read more in Appendix 2.

Credits

A zillion thanks to the beta testers who helped me get this project airborne:

Per Jelkne	Göran Jacobsson	Cesar Felipe
Leif Söderberg	Ronny Olofsson	Lester B Crooks, Jr
Gerhard Pilsl	Rickard Brinkeback	and countless others...
Kurt Nielsen	Steven Ridgell	
Lukas Sundberg	Brett Hoskins	

Thanks to Doug Dawson for letting me include his configuration and sound gauges in this package.

Kudos to all the good people in the AVSIM forums for researching all the things that Microsoft "conveniently" left out of the SDK.

A special thank you to the people at the F10 Air Base Museum and F10 Kamratförening in Ängelholm for your invaluable help and encouragement.

Thanks also to the many, many people who have contacted me about my previously released instrument panels and FDs for J 35 Draken, and who encouraged me to go down this road again.

Very special thanks go to my family, who have been very understanding and supportive during months and months of staring at a computer screen instead of being a good husband and father. ;o)

Feedback and support

Registering on the Bookmark web site will give you access to the latest updates and additions to this aircraft, and to the support forum where you can post questions, comments, and suggestions for improvement. You can also mail your thoughts to the adress below.

Happy flying!

© 2006 Thomas Nilsson, Bookmark Digital Graphics

flightsim@bookmark.se

http://flightsim.bookmark.se

Appendix 1 – COM Channels

Communication radio channels

The Com Radio Panel has 350 pre-set frequencies that are selected by setting a channel number for the desired airfield and pressing one of five keys:

A = TWR (Tower), **B** = PAR (Precision Approach Radar), **C** = TMC (Terminal Control),
C2 = TMC (alt), **D** = RRC/RSR (Regional Control)

If the Channel dial is set to **ALLM** the keys A-C-D means G-F-E and will tune in general tower and control frequencies that are active at all air fields:

G = General tower freq, **F** = General control freq, **E** = MILMET (Meterological information)

Note: Some frequencies are incorrect, and there are still a lot of blanks in the table. Do not expect ATC to work as expected. Nevertheless, it adds a touch of realism when flying in Sweden. Remember: you can always set the COM frequency manually.

NAME	CHN	A/G	B	C/F	C2	D/E
Västerås	1	130.600		125.950	125.950	
Arlanda	2	118.500				120.150
Malmen	3	129.800	125.200	126.400	135.850	
Östersund	4	130.900	119.500	130.200	135.650	
Ljungbyhed	5	130.700	125.200	129.550	133.800	
	ALLM	122.000	-	123.300	-	122.600
Karlsborg	6	127.100	120.000	130.000	132.050	
Såtenäs	7	128.200	119.300	123.000	134.550	
Barkarby	8	123.550				
Säve	9	119.050				
Ängelholm	10	127.100		135.050	132.450	118.000
	ALLM	122.000	-	123.300	-	122.600
Skavsta	11	127.700				
Kalmar	12	130.800				
Bråvalla	13	129.750	125.800	130.300	133.350	
Halmstad	14	130.100				
Söderhamn	15	128.200	119.500	129.700	135.350	
	ALLM	122.000	-	123.300	-	122.600
Uppsala	16	119.200	120.000	130.400	134.200	
Ronneby	17	119.200	120.000	129.900	128.450	
Tullinge	18	130.700	119.500	128.100	129.950	
Arboga	19	135.000				
Kristianstad	20	129.350				
	ALLM	122.000	-	123.300	-	122.600
Kallax	21	128.200	119.000	130.800	125.450	
Sturup	22	118.800				118.000
Sjöbo	23	123.650				
-	24					
Knislinge	25					
	ALLM	122.000	-	123.300	-	122.600
Byholma	26					
Uråsa	27					
Hultsfred	28	124.050				
Hagshult	29	123.250				
-	30					
	ALLM	122.000	-	123.300	-	122.600
Kosta	31					
-	32					
Landvetter	33	118.600			124.670	

Lidköping	34	124.450				
Hasslösa	35					
	ALLM	122.00	-	123.300	-	122.600
Moholm	36					
Råda	37					
Jönköping	38	118.250				
Gävle	39	122.350				
SAAB	40	118.800				
	ALLM	122.000	-	123.300	-	122.600
Kungsängen	41	120.350				
Björkvik	42					
Visby	43	120.300				
Borlänge	44	127.300				
Bromma	45	118.100				
	ALLM	122.000	-	123.300	-	122.600
Eskilstuna	46	126.850				
Örebro	47	120.270				
Tierp	48	123.400				
Gimo	49	123.300				
Strängnäs	50					
	ALLM	122.000	-	123.300	-	122.600
-	51					
-	52					
Karlstad	53	119.450				
Sundsvall	54	118.100		125.600	132.150	
Örnsköldsvik	55	122.250				
	ALLM	122.000	-	123.300	-	122.600
Kramfors	56	122.150				
Kubbe	57					
Sättna	58					
Färila	59					
Storuman	60	133.800				
	ALLM	122.000	-	123.300	-	122.600
Heden	61	130.600		126.400	128.450	
Vidsel	62	130.400			124.150	
Kiruna	63	130.150				
Skellefteå	64	122.050				
Umeå	65	119.800				
	ALLM	122.000	-	123.300	-	122.600
Fällfors	66					
Åmsele	67					
-	68					
Jokkmokk	69					
-	ALLM	122.000	-	123.300	-	122.600

Appendix 2 – NAV Channels

PN-59 Navigation

The Swedish J 35:s were not equipped with standard VOR/DME/ILS, they used another system for navigation and instrument landing called **PN-59 Navigation Radar**.

For obvious reasons I added a "standard" VHF radio for VOR navigation, but I also made the PN-59 system fully functional. It is controlled from the PN-59 Navigation Panel. You switch between standard VOR and PN-59 with a toggle switch on the Nav Radio Panel.

The military navaids in Sweden are of course not included in Flight Simulator 2004. The optional Military Navaids Scenery that was installed with this package allows you to use the PN-59 panel for realistic navigation in Sweden. The scenery is installed in the Addon Scenery directory, but is not activated. **You have to activate the scenery** through the Scenery Library settings to use it. Refer to the Flight Simulator 2004 manual for instructions on how to activate new scenery.

The real frequencies of these navaids could not be used, as FS9 only allows frequencies between 108.00 and 119.75 in 0.25 MHz increments. So I "cheated" by using frequencies that are within the allowed frequency range but seldom used. There might be some conflicts though, especially at higher altitudes where you can pick up stations at a greater distance.

Note: This function is still purely experimental. You don't *have* to use it. It is just there to add some extra realism when flying in Sweden.

Air Base / Airport			Anita (VOR)		Barbro (ILS)		Rwy	Heading
F1	Västerås	ESOW	F N	110,60	G	117,30	19	191
F3	Malmen	ESCF	F H	110,35	B	117,05	01	018
F4	Östersund	ESPC	L O	113,65	H	117,35	12	114
F5	Ljungbyhed	ESTL	-	-	A	117,00	29L	294
F6	Karlsborg	ESIA	L N	113,60	G	117,30	06	065
F7	Såtenäs	ESIB	H P	111,70	C	117,10	19	184
F8	Barkarby	ESKB	-	-	A	117,00	24	243
F9	Säve	ESGP	B I	108,40	A	117,00	19	185
F10	Ängelholm	ESDB	D P	109,70	B	117,05	14	136
					H	117,35	32	316
	(Markaryd)	-	F G	110,30	-	-	-	-
F11	Skavsta	ESKN	M P	114,70	E	117,20	26	263
F12	Kalmar	ESMQ	D L	109,50	G	117,30	16	152
F13	Bråvalla	ESCK	H N	111,60	D	117,15	15	147
F14	Halmstad	ESMT	H O	111,65	G	117,30	19	185
F15	Söderhamn	ESNY	F I	110,40	C	117,10	30	311
F16	Uppsala	ESCM	B H	108,35	B	117,05	08	071
					D	117,15	21	209
F17	Ronneby	ESDF	K M	112,55	F	117,25	19	188
F18	Tullinge	ESCN	D H	109,35	F	117,25	24	245
F20	Everöd(Krstd)	ESMK	B E	108,20	D	117,15	19	187
F21	Kallax	ESPA	F M	110,55	D	117,15	14	137
-	Uråsa(Växjö)	ESFU	-	-	H	117,35	16	159
-	Hultsfred	ESSF	O P	115,70	A	117,00	30	295
-	Hagshult	ESMV	G M	111,55	C	117,10	22	222
-	Visby	ESSV	D I	109,40	A	117,00	21	201
-	Borlänge	ESSD	H I	111,40	-	-	-	-
-	Eskilstuna	ESSU	-	-	B	117,05	18	176
-	Kramfors	ESNK	B M	108,55	D	117,15	35	349
-	Gunnarn	ESUD	G P	111,70	E	117,20	33	329
-	Heden	ESPJ	-	-	C	117,10	12	113
-	Vidsel	ESPE	M O	114,65	A	117,00	29	295
-	Kiruna	ESNQ	G I	111,40	H	117,35	21	210
-	Jokkmokk	ESNJ	B L	108,50	G	117,30	32	320

Appendix 3 – Checklists

J 35 DRAKEN PROCEDURES

Version: 2.4
Date: 2006-03-08

BEFORE STARTING THE ENGINE	
PARKING BRAKE	Set
LT INDICATOR LIGHT	On
FT INDICATOR LIGHT	On
BATTERY SWITCH	On
WARNING LIGHTS (ON)	TANKL, TANKP, OLJETRYCK, ELFEL, HYD I, HYD II (and HUVLÅS if canopy open)
GEAR LEVER	Down/locked
CANOPY	Close and lock (HUVLÅS warning light OFF)
THROTTLE	Ground idle
CHUTE INDICATOR	Green
RADIOS/NAV	Set frequencies and mode
LANDING/TAXI LIGHTS	Off
RAT	On (EBK warning light lit)
STBY ALTIMETER	Set
FUEL MODE SWITCH	Off
SUIT COOLING	As needed
PN-59	FÖRV
CLOCK	Set
STALL WARNING NORMAL/EARLY	As needed
OXYGEN	Min 80 kp/cm^2
RADAR	BER
WEAPONS SELECT	Off
CIRCUIT BREAKERS	On (all)
DEICE CANOPY	As needed
AIR CONDITIONING	Auto

STARTING THE ENGINE	
FUEL VALVES (LT MOTOR/EBK)	On
STARTER	Push 2 sec to start
EXHAUST GAS TEMP, STARTUP	Max 700 °C
EXHAUST GAS TEMP, GROUND IDLE	Max 350 °C
ENGINE RPM, GROUND IDLE	30±2 %
ALTERNATOR	On (press and hold 2 sec)
LT INDICATOR LIGHT	Off
WARNING LIGHTS	Off (all except EBK)

BEFORE TAXI	
RADAR	**TILL(On) or TYST(Silent)**
ALTIMETER	**Set**
ATTITUDE INDICATORS	**Check**
STALL WARNING	**Test**
SPEED BRAKES	**Check**
CONTROL SURFACES	**Check**
HYDRAULIC PRESSURE	**Warning light HYD II should light with full back/fwd stick.** **Warning light HYD I should be off.**
PN-59	**NAV 40 or NAV 400**
FUEL MODE SWITCH	**On**
FT INDICATOR LIGHT	**Off**
FUEL GAUGE	**Test**
WARNING LIGHTS	**Test**
GEAR LIGHTS	**4 green**
AUTOPILOT	**Test** **(Select ATT mode, check that stick movement overrides autopilot)**
AUTOPILOT MODE	**DÄMPN**
DEICE ENGINE	**As needed**
NAVIGATION LIGHTS	**As needed**
BRAKE PRESSURE	**Check**
PARKING BRAKE	**Release**

BEFORE TAKE-OFF	
HEADING INDICATOR	**Check**
ATTITUDE INDICATORS	**Check**
WARNING LIGHTS	**Off (except EBK if RAT is ON)**
MASTER WARNING LIGHT	**Off**
LANDING LIGHTS	**On**
TIMER	**Start**

TAKE-OFF	
TOE BRAKES	**Apply**
ENGINE RPM	**70%**
DEICE ENGINE	**Off (If icing is visible on ram air intakes - keep deice ON)**
TOE BRAKES	**Release**
THROTTLE	**Full**
EGT	**600–750 °C**
ENGINE RPM	**99.5–100 %**
WARNING LIGHT EBK	**Off**
AFTERBURNER	**As needed** **Max EGT with A/B (mom) 800 °C**
AIRSPEED INDICATOR	**Check**
STBY AIRSPEED INDICATOR	**Check**
V2	**270 kmh**

INITIAL CLIMB	
GEAR	**Retract (Max 375 kmh)**
AFTERBURNER	**As needed**
DEICE ENGINE	**Off (Min 600 kmh)**
LANDING LIGHTS	**Off**

CLIMB AND CRUISE

CLIMB SPEED, FULL THROTTLE	**Vi 850 kmh–M 0.9**
CLIMB SPEED, AFTERBURNER	**M 0.9**
CRUISE SPEED	**M 0.9**

DESCENT

DEICE CANOPY	**MAX**
THROTTLE	**Ground Idle**
DESCENT SPEED, VFR	**Vi 850 kmh–M 0.9**
DESCENT SPEED, IFR	**Vi 550 kmh**

APPROACH AND LANDING

SEAT POSITION (VIEWPOINT)	**Adjust**
STANDBY AIRSPEED	**Check**
STANDBY ALTIMETER	**Check**
SPEED BRAKES	**Extend, reduce speed to 500 kmh**
GEAR	**Extend (Max 500 kmh)**
GEAR LEVER	**Check**
GEAR LIGHTS	**Check 4 green**
BRAKE PRESSURE	**210 kp/cm^2 (ca)**
LANDING LIGHTS	**On**
TURN TO FINAL	**400–325 kmh**
FINAL APPROACH SPEED	**300–290 kmh, 12 °α, 3 ° slope**
TOUCHDOWN SPEED	**290–270 kmh**

AFTER LANDING

SPEED BRAKES	**Retract**
LANDING LIGHTS	**Off (Max 2 min ON on ground)**
TAXI LIGHTS	**As needed**
SEAT POSITION (VIEWPOINT)	**Reset**
TIMER	**Check flight time**

SHUT DOWN

PARKING BRAKES	**Set**
THROTTLE	**Close**
FUEL VALVES (LT MOTOR/EBK)	**Off**
CANOPY	**Open**
RADIOS	**Off**
PN-59	**Off**
TAXI LIGHTS	**Off**
NAVIGATION LIGHTS	**Off**
CIRCUIT BREAKERS	**Off**
TRANSPONDER	**Standby**
BATTERY SWITCH	**Off**

NOTE: The checklists have been modified for use with Flight Simulator.

Appendix 4 – Swedish–English glossary

Translation of some Swedish text in the cockpit.

MISCELLANEOUS	
EBK	Afterburner
TILL	On
FRÅN	Off
AVST[ÅND]	Distance
HUVUDVARN[ING]	General Warning
LUFTBROMS	Air Brake
LANDSTÄLL	Landing Gear
FÄLLTANKAR	Drop Tanks
MÄTSYSTEM F-TANK	Measuring System, Drop Tanks
DRÄKTVENT[ILATION]	Suit Ventilation
TIDIG	Early

ENGINE PANEL	
INSTR[UMENT] LYSE	Instrument Lights
HUVUDSTRÖM	Main Power (Battery Bus Switch)
TÄNDSTRÖM	Ignition
KRAN	Valve

AUTOPILOT	
ATTITYD	Attitude
DÄMPN[ING]	Damping
ROLL	Roll
GIR	Yaw
SVÄNG	Turn
TRYCK OCH VRID	Push And Twist

ELECTRICAL PANEL	
LANTERNOR	Nav Lights
HEL	Full
HALV	Half (Dimmed)
BLINK	Flashing
IND[IKERINGS] LAMPOR	Indicator Lights
NÖDSTRÖM	Emergency Power
PROV	Test
AVISNING MOTOR	Deice, Engine
AVISNING HUV	Deice, Canopy
LÄGRE	Decrease
HÖGRE	Increase
KABINLUFT	Cockpit Air
KALLT	Cold
VARMT	Hot

RADAR PANEL	
LJUDTRÖSKEL	Audio Threshold
LJUSSTYRKA	Light Intensity
BELYSNING	Illumination
RASTER	Grid
KORSVISARE	Crossbars
VAPENVÄLJARE	Weapons Selector

WARNING LIGHTS	
BRAND	Fire
STYRAUTOMAT	Autopilot
SKALTEMP[ERATUR]	Hull Temperature
TANKLUFT	(Fuel) Tank Air
TANKPUMP	(Fuel) Tank Pump
OLJETRYCK	Oil Pressure
SYRGAS	Oxygen
ELFEL	Electrical Fault
KABINTRYCK	Cabin Pressure
HUVLÅS	Canopy Lock