

Saab 35 Draken for Flight Simulator 2004

Installation Instructions and Flight Manual

Version 3.1, January 2007



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Radar module based on TrafficRadarXML module by Arne Bartels.

Configuration and sound gauges by Douglas Dawson.

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1 Introduction

Thank you for downloading this simulation of the Saab 35 Draken, a jet fighter that was in continuous use during five decades!

The first Saab 35 prototype flew in October, 1955, and it entered service as J 35A in the Swedish Air Force in March, 1960. The last to be retired from operational service were the 35OE of the Austrian Air Force, who held on to their Drakens until November, 2005.

The version exported to Austria was a modified J 35D with different avionics, RWR and ECM. The three Danish Air Force versions were based on J 35F but extensively rebuilt as ground attack, recce and training aircraft, with NATO standard instrumentation, RWR and ECM. A number of 35B, C and F were also bought (and later license-built) by the Finnish Air Force.

The powerplant in all later versions was the Volvo Flygmotor RM6C, a modified license-built RR Avon Mk 60 series turbojet with a Swedish single-stage afterburner, capable of pushing the fastest version (J 35D) to Mach 2.

Draken was in constant development, and the last Swedish version, J 35J, was very different from the cold-war-era J 35A. From the very beginning Draken was a very capable high-speed interceptor/strike aircraft with impressive performance, and in its final version a reliable platform for delivering radar and infra-red homing missiles. It featured state-of-the-art avionics and was in many ways ahead of its time.

Missed by pilots, mechanics and plane buffs all over the world, this beautiful and quite unique aircraft now continues to fly in FS2004.

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



INTRODUCTION

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2 Installation

Please read the [End User License Agreement \(EULA\)](#) before installing.

This installation is a complete package with model, textures, flight dynamics, panel, sounds and effects. No other files are required – except (of course) Flight Simulator 2004.

NOTE: Please check that you have installed DirectX 9 and have the latest (working) drivers for your graphics card.

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 files in their correct locations. Duplicate files will be overwritten where necessary. Please note that older versions of Draken will not work properly after this version has been installed. I strongly suggest that you delete earlier versions to avoid potential conflicts.

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



This version will only work in Flight Simulator 2004 (FS9). It will work erratically in FSX, and not at all in FS 2002 or earlier.

INSTALLATION

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3 **Description**

The model is made in GMax and has approximately 48,000 polygons including the Virtual Cockpit. It is modeled from Saab blueprints and Swedish Air Force manuals, and from lots of photos.

Most textures were hand-painted by me in Photoshop. Photos were hardly ever used for texturing, except for the main panel background, which was pieced together from my own photos, and some decals that were either photographed by me or scanned from books.

Some of the features

- Realistic hydraulic and electrical systems
- Authentic navigation systems
- Fully functional AI/MU traffic radar
- Afterburner with sound and visual fx
- Animated, fully functional Emergency Power Unit
- Animated drop tanks
- Animated, fully functional drag chute
- Animated exhaust nozzle (eyelids)
- Loadout configuration panel
- "Last state" config file – when you exit the simulation, the position of switches and dials will be saved and loaded with the aircraft.

Virtual Cockpit

Some switches and controls are hard to operate in the VC, simply because of the general clutter in the cramped Draken cockpit. I had to make some compromises in the VC to allow for better functionality, such as removing the joystick and pedals.

I personally still think that the 2-D Cockpit View is the best environment when flying this aircraft. A matter of taste perhaps.

Textures

The exterior models include three aircraft from the 10th Swedish Air Force wing (F10) in Ängelholm, Sweden, as well as an Austrian and a Finnish version. The export versions do not have the corresponding instrumentation yet, only exterior details and textures. Please visit our website for information on updates and new releases.

A layered repaint kit in Photoshop format is provided as a separate download. You can create and distribute your own textures freely, just remember to include proper credits. Do **NOT** include the aircraft model with your repainted textures!

DESCRIPTION**Effects**

A high altitude contrail will show up below -30°C. Smaller wingtip contrails will appear at low altitude and high G load.

Afterburner visual and sound effects are included. They are triggered by the Afterburner/Reheater key command.

NOTE: The afterburner effects are controlled by “invisible” gauges on the instrument panel. This means that they will only work if you have loaded the instrument panel at least once by switching to Cockpit View or Virtual Cockpit View. After that, they will work in any view.

Sounds

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

The cockpit and afterburner sound fx are triggered by a special gauge (dsd_xml_sound3.gau). This gauge, and the gauge that saves the panel state (COP_config.gau), were made by Douglas Dawson and included in this package with his kind permission.

Flight Dynamics

The flight dynamics (flight model) is the result of years of trial-and-error by me and a number of helpful former J 35 pilots and mechanics. It is fairly accurate but definitely not perfect, and changes (hopefully) to the better for each new version.

If you have any hands-on experience flying or working with the real Saab 35 you are most welcome to contact me and suggest changes.

4 *Before you fly*

I cannot say this too many times:

Read This Fine Manual 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: **SHIFT-F10**) and at the end of this document. These checklists are enough to get you started, but reading the descriptions of instruments and systems will give you a much better understanding of the aircraft, and a much more satisfying experience.

The appendices contain additional information, check lists, and a short Swedish/English glossary which translates most of the panel labels.

About the Flight Manual

Special fonts, bullets and frames are used throughout this document to emphasize and indicate different information:

This is a link to another part of this document: [Version history](#)

This is a menu or key command in FS2004: **TOGGLE GEAR**

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.



WARNING!

This is an even more important message. Ignoring this instruction might result in loss of control and/or damage to the aircraft.

BEFORE YOU FLY

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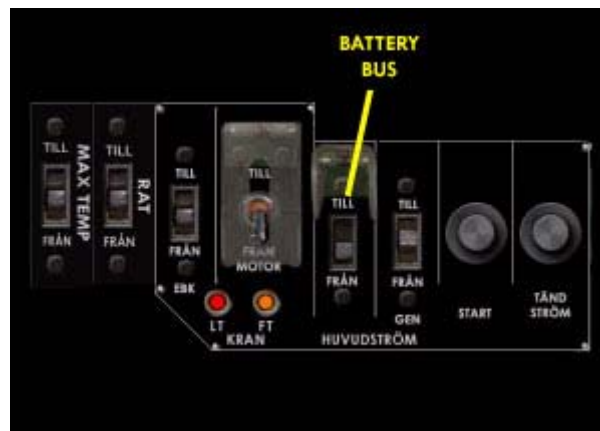
5 Quick Start

This is a sort of illustrated checklist for those of you who are eager to get up there and won't bother to read all the boring stuff about hydraulic pressures etc. Well, happy landing to you.

Before starting the engine

NOTE: The Engine Panel is wired to the hot battery bus, so the LT and FT warning lights should be lit even when the Main Bus is switched off. If these warning lights are **not** on, the battery is dead. Reload the aircraft to remedy this.

1. Switch on the Main (Battery) Bus. TILL means on, FRÅN means off.

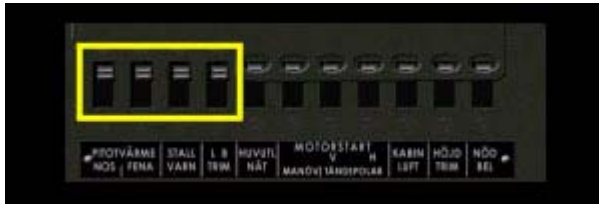


2. A number of warning lights will light up on the Annunciator Panel, and the Master Warning flashes. When the canopy is open, the HUV LÅS warning light will also be lit. If it is, close the canopy with the key command for Exits (**SHIFT-E** is default).



QUICK START

- Switch on the circuit breakers for Pitot Heat (nose and fin), Stall Warning System and Speed Brake Trim.
The other circuit breakers are permanently on in this version.



- Check the Gear Indicator, it should show **three** green lights. The fourth (spur wheel) indicator will light up when there is enough hydraulic pressure to operate the spur gear.

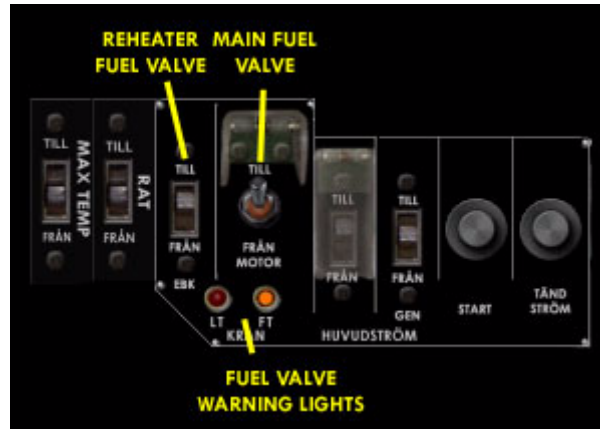


- Set the Fuel Mode Switch MÄTSYSTEM FTANK to FRÅN (off). This will close the external tank fuel valves before starting the engine.



The external tank fuel valves MUST be closed before the engine is started. Otherwise the main tanks will not be available after starting, regardless of switch position.

6. Switch on the Main Fuel Valve (LT MOTOR) and the Reheater Fuel Valve (LT EBK).
Check that the red LT warning light is lit and the orange FT warning light is unlit.

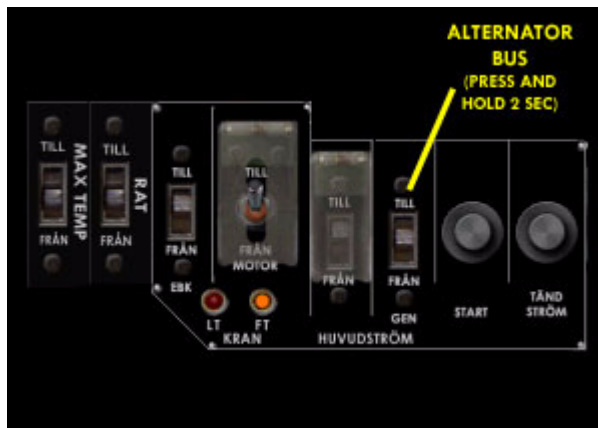


QUICK START**Starting the engine**

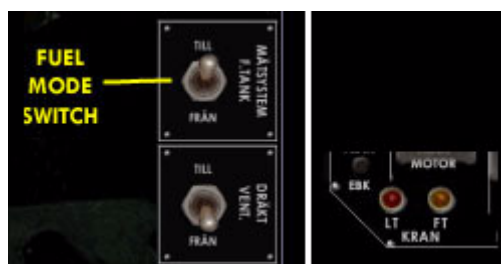
1. Press and hold the START pushbutton for 2 seconds. The oil and hyd pressure warnings should disappear as the engine spools up. The fourth gear indicator light (spur wheel) should now be lit. Two warning lights should remain, indicating that AC power is not yet available:



2. When engine rpm is >30 %, press and hold GEN TILL for at least 2 seconds to connect the alternator bus. All warning lights on the Annunciator Panel should now be unlit.



3. Set MÄTSYSTEM FTANK to TILL (on). This will open the external tank fuel valves so that drop tanks are drained before main tanks. Check that the FT warning light on the Engine Panel is unlit.



Taxiing and take-off

1. Set radio frequencies and nav systems to desired settings. Check that the transponder is on (not in STANDBY).
2. To taxi, use about 60% rpm to start rolling, then reduce throttle.
3. When lined up on the runway, apply parking brake and center the nose wheel.
4. Check control surface movement. Moving the joystick to its end positions might cause the HYD II warning light to light up briefly and the EPU to extend then retract again. This is normal.
5. Release the parking brake and hold the aircraft with toe brakes.
6. Increase engine rpm to 70%, release toe brakes, then increase to full military throttle. Use afterburner as needed.
Check that RPM is within 98–105 rpm.
Check that EGT is within 600°–750° C.
7. Start rotation at 250 kmh, lift off before you exceed 320 kmh.
8. Retract gear before you exceed 400 kmh.
9. Shut off afterburner at 500 kmh. If you want to climb on afterburner, keep the AOA up to avoid overspeeding.

That's it! You're airborne!



Flying the aircraft, navigation, approach and landing is discussed in the following chapters. See for instance [***Flying the J 35J***](#).

QUICK START

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6 *Key commands and special features*

Afterburner/Reheater (EBK)

The afterburner will **not** ignite automatically at full throttle, as in many other FS9 jet fighters. It is activated with the **TOGGLE AFTERBURNER** key command. The default key command for this is **SHIFT-F4**.

If you have problems getting the afterburner to work, first of all check your key assignments.

You will definitely know if it **is** working: you will have a notable thrust boost, the engine sound will take on a deeper note, and a text message **REHEATER ON** will appear in 2D cockpit view. In exterior view you will see a flame and some exhaust smoke, and you can also see the exhaust eyelids open up slightly.

The afterburner indicator light (EBK) on the Annunciator Panel should light up briefly as the exhaust eyelids change position. Please note that this light is **not** an indicator for afterburner on/off!

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

The following criteria must be fulfilled to ignite the afterburner:

- Throttle >95 %
- Reheater fuel valve open (LT EBK on the Engine Panel)
- Remaining total fuel >5 %

NOTE: The afterburner effects are triggered from a gauge on the instrument panel. If you are in Spot View or Tower View when loading the aircraft you have to switch to Cockpit View at least once to load the instrument panel – otherwise the afterburner (and a number of other things) will not work.

KEY COMMANDS AND SPECIAL FEATURES

Drop tanks

The Swedish J 35J has two 525-liter external tanks under the fuselage as standard, and can optionally be fitted with two more on the “wet” outer wing pylons.

Please note that in this simulation, wing tank equipped aircraft are in a separate model which can not have missiles on the outer pylons. See also [Armament](#).

The external tanks are jettisoned with the **RELEASE DROP TANK 1/2** key commands. Belly Tanks = Drop Tank 1, Wing Tanks = Drop Tank 2. Check your key assignments in FS9, as you might have to add these key commands.

NOTE: It takes two successive keystrokes to drop the tanks: First click to unlock, second click to release.

Drag chute

The drag 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, the second click will release it from the aircraft. The third click will reset the chute and close the hatches (yes, yes, not at all realistic but very handy if you accidentally deploy it in flight).

DECREASE FLAPS INCREMENTALLY will also reset the chute.

The chute will tear if airspeed exceeds 400 kmh. It will release automatically when ground speed is below 70 kmh.

NOTE: The drag chute lever can only be operated when the throttle lever is set below 89 %.

Canopy

The canopy is opened with the **SELECT EXIT** key command, **SHIFT-E** is default. As always, check your key assignments if it doesn't work.

When the canopy is open, the HUV LÅS warning light is lit.

Opening the canopy in mid-air is generally a bad idea. At high altitude you will lose cabin pressure (and the canopy itself, at any altitude) and the KABIN TRYCK warning light will be lit.

7 Flying the J 35J

Demanding fun

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 was a child of the cold war era and originally intended as a high-altitude interceptor, to counter the MiGs and Sukhois of the day. Its real strength was eventually to be found in low-and-fast attack runs. In expert hands, this aircraft will overtake and outturn anything.

Watch those dials

Although you will never reach the much-advertised Mach 2 in the J 35J version (only some optimized J 35D models could), acceleration on afterburner is fierce and you will easily overspeed at low altitude. After take-off, retract gear before exceeding 500 kmh (which you will in seconds) or you will risk damage to the brake hydraulics.

On the downside, speed bleeds off just as fast when you throttle down and with rising angle of attack. Always keep an eye on the AOA meter – at $\alpha=18^\circ$ you will start losing speed and gaining alpha very quickly, and eventually end up in **Superstall**.

Superstall

Superstall is an apt name for this very unpleasant phenomenon: the delta wing does not stall gradually like a conventional wing; at the critical angle of attack the whole wing stalls simultaneously *without warning* and turns you into a flying brickyard. Hence the Stall Warning System, which starts rattling at approximately 15 degrees aoa.

I have not been able to simulate superstall realistically in this model, it is more a sort of tumbling spin. Enough to get your heartbeat up.

Quirks and limits

The aircraft rolls pretty fast within the 0.75–0.95 M range, and was actually restricted to 4 sec/360° minimum at airspeed >0.75 M or below 8000 m altitude. Same thing if you were carrying stores. A clean aircraft above 8000 m or below 0.75 M had no limits. You can comply with these restrictions or not, that's your own business.

Flying inverted or with negative G is limited to 15 seconds. More than that and the fuel system will start acting up. Is this included in the simulation? Find out for yourself.

In the transsonic speed range (0.98–1.05 Mach or so) the elevons will be sluggish because of the high dynamic pressure, and you will be unable to pull more than 3–4 G at low altitude. This is one of Draken's more "interesting" quirks.

FLYING THE J 35J

The double delta wing has good characteristics within the envelope, but it creates an exceptional amount of drag at high angles of attack. Above $\alpha=15^\circ$ the aircraft will not accelerate, even on afterburner! This of course invites to some “creative” flying that might or might not end in disaster. At 650–700 kmh, bank 90° and pull hard on the stick, the aircraft will almost skid around like a race car. Just watch that AOA or you might make a Niki Lauda.

The famous “Cobra” was reputedly performed as early as the 1960s by Draken aircraft. Not for the faint of heart, this is really fun to do. Try it!

Split-S maneuvers should not be attempted at airspeed above M 0.9 or 700 kmh, as you will not be able to achieve enough AOA to keep the aircraft from accelerating uncontrollably in the dive. But stay within limits and the Draken is an excellent aerobatics performer.

The 35 glides like a brick. In case of flameout, follow the procedure for restarting the engine in [Emergency Procedures](#).

Navigation

This model has several systems/methods for navigation within Swedish airspace. Standard VOR/ILS instruments are included for flying in the rest of the world, although this did not exist in the real J 35J.

Approach and landing

Apply speed brakes and decelerate to 500 kmh at 400 m altitude. Extend gear <500 kmh, increase throttle to counter for gear drag. Watch your speed and let it bleed off gradually to 400 kmh before the final turn, 325 kmh minimum when you exit the turn.

Landing is tricky because of the high angle and lousy forward view. Aim for a long, straight final at 300–350 kmh and $\alpha=12^\circ$ with gear down and speedbrakes deployed. Engine rpm should be 80–85% at this point. Touch down at 280 kmh minimum, 320 kmh if heavy. Do **NOT** pull up or cut the throttle before touch down!

To go around, retract speed brakes and floor the throttle. Use the afterburner if necessary. Retract gear as soon as the aircraft starts to accelerate.

After TD, keep the nose up for aerodynamic braking as long as possible, then add wheel brakes. Use the drag chute if you are heavy or on a short runway.



WARNING!

Be very careful below 325 kmh! If you pull up you will gain AOA and lose speed very quickly, with little chance of recovery. If you have any doubts about your ability to make a safe landing – GO AROUND.

8 Instrument Panel and Systems

Cockpit View

If you are uncomfortable with metric units, I recommend that you enable **COCKPIT TOOLTIPS** in the FS9 General Settings. Moving the cursor over each instrument will present readings in both metric and US units, as well as additional information for some instruments.

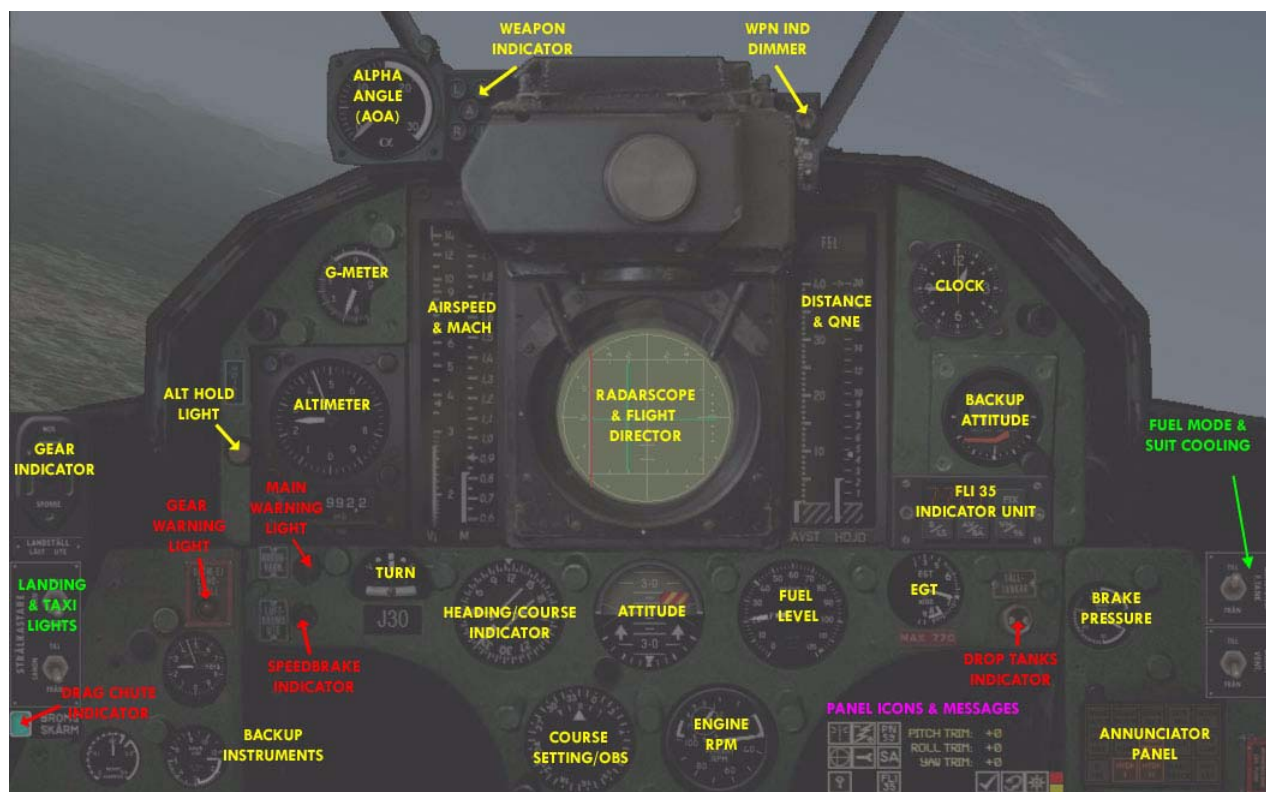


Fig. 1 Main Instrument Panel, Cockpit View

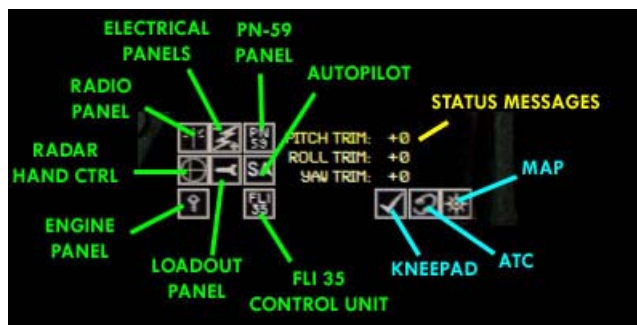


Fig. 2 Panel icons and message box

INSTRUMENT PANEL AND SYSTEMS**Virtual Cockpit**

Fig. 3 The Virtual Cockpit View

All instruments, and most controls (but not all) are found both in the 2D cockpit and in the Virtual Cockpit. There may be slight differences in how the switches and dials behave or look depending on which view you are in, but the function should be identical.

NOTE: In the VC, instruments will not move as fast and smooth as in the 2D view. This is because the VC is rendered as a model-within-the-model, and has a limited update rate. A better graphics card will **not** remedy this, but a faster processor and more memory will.

Altimeter



Fig. 4 Altimeter and barometer setting

The altimeter shows the altitude in meters, fed by digital data from the flight computer. The needles do not move smoothly but in small increments, and reaction can be slightly delayed. This is not sloppy programming by me, it behaves like this in the real aircraft. Really!

Altitude (Kohlsman) setting is in millibars (hPa).
 $1 \text{ Atm} = 1013.25 \text{ mb} = 760 \text{ Hg}$.

Backup altimeter

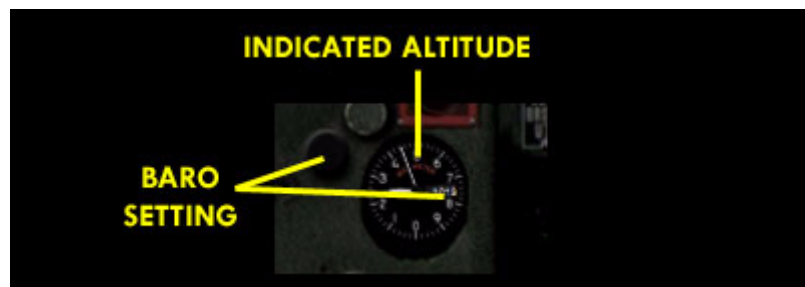


Fig. 5 Backup Altimeter

The backup altimeter on the left knee panel is mechanical and directly fed from an aneroid. It is completely separate from the main altimeter, and has its own barometer setting.

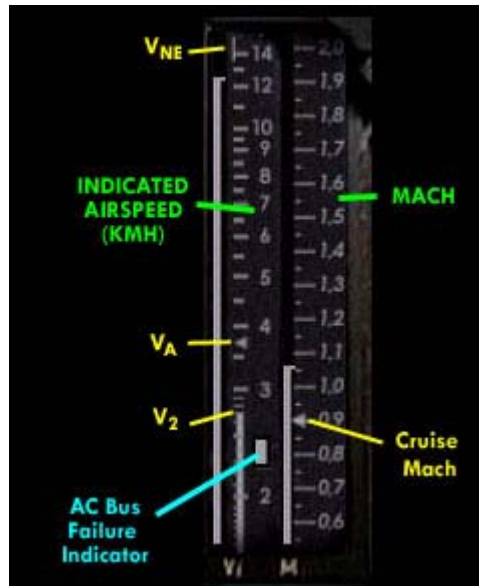
INSTRUMENT PANEL AND SYSTEMS**Airspeed/Mach Indicator**

Fig. 6 Airspeed/Mach Indicator

The left tape shows V_i (indicated airspeed) in kilometers/hour. The scale is linear from 150–350 kmh, and logarithmic from 350–1450 kmh. The right tape shows Mach 0.5–2.0 on a linear scale.

The V_i scale has markings for never exceed (1350 kmh), approach (375 kmh) and minimum airspeed (270 kmh). The Mach scale has an index at recommended cruise Mach (M 0.9).

The small white rectangle indicates AC bus failure. It should not be visible if engine rpm is >27% and the alternator bus is switched on.

Backup Airspeed

Fig. 7 Backup Airspeed Indicator

The backup ASI is mechanical and fed directly from the pitot system. It shows indicated airspeed between 150 kmh and 1200 kmh.

NOTE: The backup ASI use the stab fin pitot tube, while the flight computer uses the nose pitot.

Cabin Pressure



Fig. 8 Cabin pressure gauge

Cabin air pressure is regulated by a pressure regulator. The Cabin Pressure gauge shows the difference between outside pressure and cabin pressure. Difference should be zero up to 3000 m altitude, and then increase with altitude to a maximum of $\sim 0.25 \text{ kp/cm}^2$ (24.5 KPa) at 6400 m.

Brake Pressure



Fig. 9 Brake pressure gauge

The wheel brakes are hydraulic self-adjusting anti-lock disk brakes. Normal brake pressure is 210 kp/cm^2 (20 MPa). At least 60 kp/cm^2 (5.9 MPa) is needed for effective braking.

! Extending gear at airspeed >500 kmh can result in damage to the hydraulic lines for the wheel brakes.

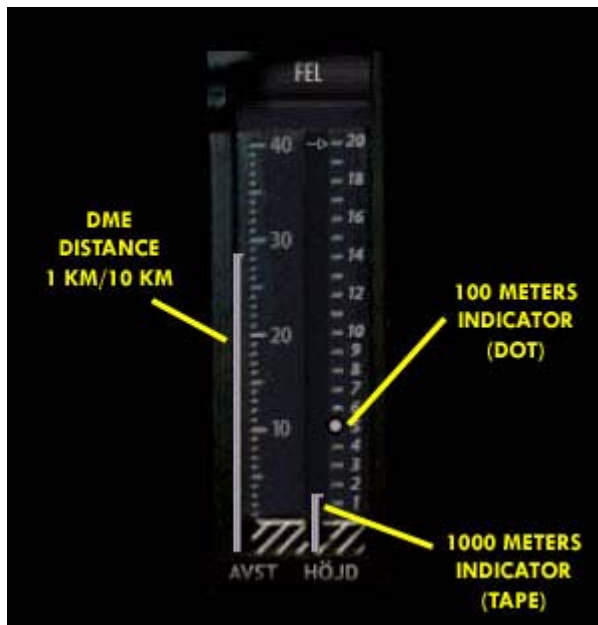
INSTRUMENT PANEL AND SYSTEMS**Distance and QNE Indicator**

Fig. 10 Distance/QNE Indicator

The left scale shows distance to the currently selected navigational aid in ranges 0–40 km or 0–400 km depending on the FD Mode Selector setting. See also [PN-594 navigation radar](#).

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

The small arrow shows target altitude (not used in this version).

The window at the top shows STRIL (mission command) commands and info. Not used in this version.

G-meter

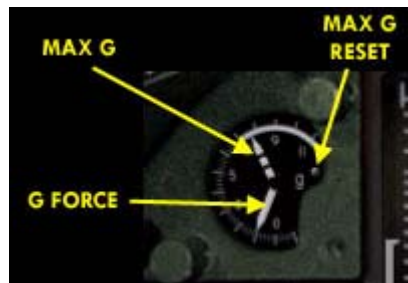


Fig. 11 G-meter

The G Meter shows acceleration force in the range -1.5 to +11.5 G. It also has a maximum needle which is reset by pushing the reset button on the right side of the meter.

An acoustic warning signal is triggered at approximately +6 G.

The G meter is automatically disconnected when the aircraft is on the ground.

Chronometer



Fig. 12 Chronometer

The chronometer in J 35J is electrical and shows the current local time in hours/minutes. It also has a stopwatch and a moving index used to monitor flight time.

Before take-off, turn the outer ring of the chronometer so that the index is aligned with the minute hand. The duration of the flight can then be determined from the position of the minute hand vs. the index.

Clicking on the stopwatch pushbutton will successively start, stop and reset the stopwatch.

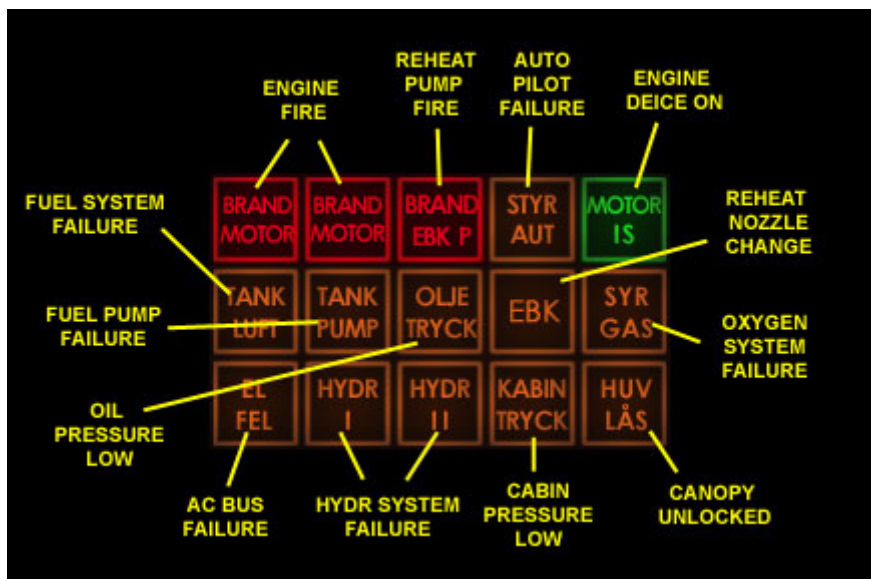
INSTRUMENT PANEL AND SYSTEMS**Annunciator/Warning Lights Panel**

Fig. 13 Annunciator/Warning Lights Panel

NOTE: The Electrical Panel has switches for dimming and testing the warning/indicator lights.

In normal flight, none of the lights on the annunciator panel should be visible. A light indicates either a malfunction or that a special function is temporarily active.

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.

The warning lights usually trigger a **General Warning** (GW). The GW light (orange, flashing) is located on the left side of the main panel.

When the Emergency Bus is switched on manually but no alternator fault is detected, the ELFEL and TANKPUMP lights will be on, but a GW is not triggered.

At ground idle, hydraulic pressure is usually not sufficient to deflect the elevons fully. Large movements of the stick will sometimes trigger a HYD II warning and extend the EPU. This is perfectly normal. GW is usually not triggered in this case.

TANKLUFT sometimes lights up for a few seconds when the fuel system switches from external to main fuel tanks. This is perfectly normal and will not trigger a GW.

MOTOR IS (green) is a reminder that engine de-icing is ON. It will not trigger a GW.

EBK is **not** an indicator for afterburner on/off, it just indicates that the exhaust nozzle “eyelids” are opening or closing. It should light up briefly (max 2 sec) when you turn the afterburner on/off, and show a steady light when the RAT function is active, see [**MTR and RAT**](#). It will not trigger a GW.

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

STYR AUT means autopilot failure. It will also be lit if you switch off the autopilot main switch.

INSTRUMENT PANEL AND SYSTEMS

FLI 35 system

The flight control system in J 35J is called **FLI 35**. It includes the main gyro, attitude and horizontal situation indicators, and a simple fix point navigation system. FLI 35 processes data from gyro, sensors and monitors, and basically keeps the aircraft updated on its position in the air. The system also automatically compensates for magnetic deviation and gyro drift.

Ten navigation waypoints (in Sweden) can be stored. The microcomputer will calculate course, distance and estimated fuel consumption to the currently selected WP and present it on the **Indicator Unit**.

In this version, 45 pre-programmed waypoints are available.

See [Appendix 2 – NAV Channels](#).

NOTE: When STRIL is selected on the FD Mode Selector, the Flight Director will guide you to the selected waypoint. This is NOT authentic, but very useful.

Main flight instruments



Fig. 14 Main instruments

The HSI has two needles and a moving scale which shows real magnetic heading.

The Course Needle (double) shows the selected course.

The Bearing Needle (single) points to the current navaid in NAV40/400, LANDN40 or BARBRO modes (see [PN-594 navigation radar](#)).

In STRIL mode, it points to the current waypoint.

The Course Selector functions as OBS setting in MHz/manual mode (see [Radio stack](#)), and will then affect the Flight Director.

In PN-59 mode, it only changes the Course Needle setting.

FLI 35 Indicator Unit



Fig. 15 FLI 35 Indicator Unit

Pressing B/LS repeatedly will cycle through the ten waypoints.

Calculated course/distance to the selected waypoint is shown alternately for 2 seconds. To avoid confusion, course is always shown with three digits (000–359).

Estimated fuel consumption to the selected WP is shown as a percentage of total fuel capacity, external tanks included.

Pressing FIX will update the selected waypoint with the current aircraft position (function disabled in this version).

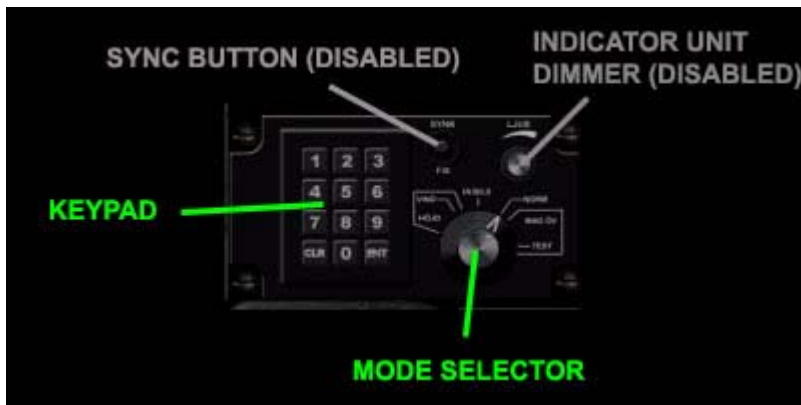
INSTRUMENT PANEL AND SYSTEMS**FLI 35 Control Unit**

Fig. 16 FLI 35 Control Unit

The Control Unit is used to select Indicator Unit presentation mode and for programming waypoints.

Waypoint codes are found in [Appendix 2 – NAV Channels](#).

PROGRAMMING WAYPOINTS:

1. Press B/LS on the Indicator Unit to select a waypoint.
2. Set the Mode Selector to IN B/LS.
3. Press CLR.
4. Enter the waypoint code on the keypad (e.g. 9010 for Angelholm).
5. Press ENT.
6. Press B/LS on the Indicator Unit to select another WP and repeat steps 3–5.
7. When finished programming waypoints, set the Mode Selector to NORMAL.

Radio stack

J 35J has two radio transceivers for voice and data communication: **FR 28** (UHF/VHF) and **FR 21** (VHF). The radios are permanently connected to the main bus and have no master switch. FR 28 is used for voice communication only. FR 21 is normally used for data communication, but can be used for voice com if FR 28 fails.

The radio control units **ME 1**, **ME 2** and **ME 3** are used in combination to control FR 28 and FR 21.

NOTE: The radios in this simulation do not function exactly as their real counterparts – we have to make it work with FS9 ATC, right?

ME 1 Radio Control Unit

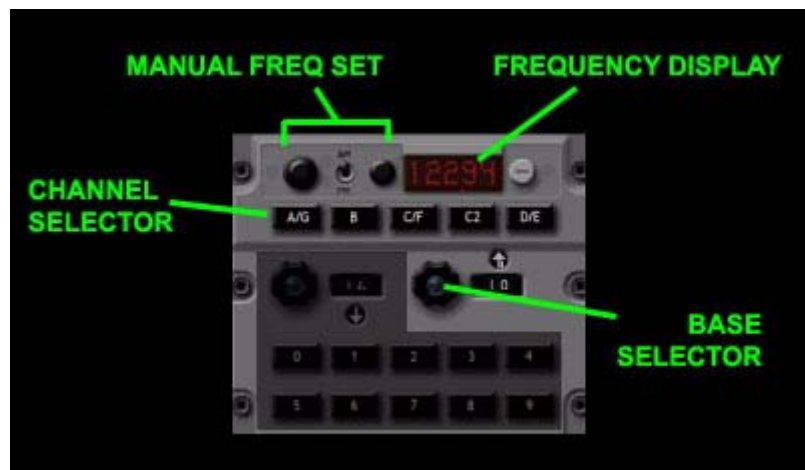


Fig. 17 ME 1 Radio Control Unit

On this panel you select one of 69 Swedish airfields and a preset channel for TWR, TMC, etc. See [Appendix 1 – COM Channels](#) for a list of airfields and channels. The frequency can also be set manually in the normal FS9 COM 118.00 – 121.75 range. In either case, the selected frequency is shown on a LED display.

Accepting a frequency change in ATC will always override the current preset or manual setting.

The FM/AM switch has no function in FS9.

The left dial and the numerical keys on the lower half of the panel are used for special tactical radio channels, not used in this version.

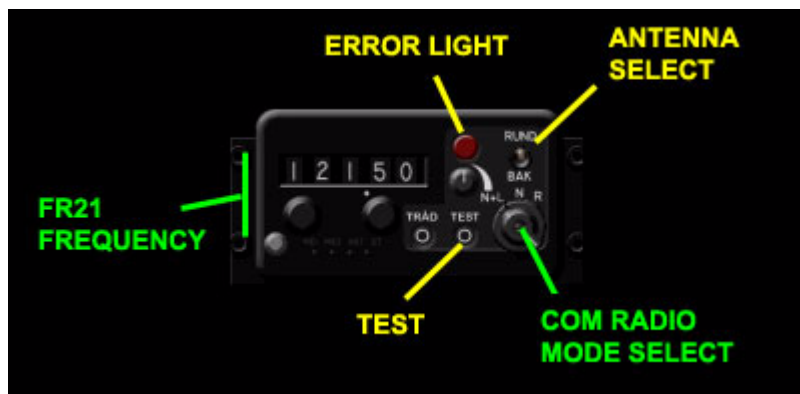
INSTRUMENT PANEL AND SYSTEMS**ME 3 Radio Control Unit**

Fig. 18 ME 3 Radio Control Unit

This panel is used to select com radio modes and as a frequency selector when FR 21 is used for voice communication.

Table 1: Com radio mode select

N+L	FR28 used for voice com, FR21 for data com. Listening on emergency freq 121.50.
N	FR28 used for voice com, FR21 for data com.
R	FR28 disabled, FR21 used for voice com. No data com.

RUND/BAK toggles between omni and rear-facing antenna.

TEST will trigger a 1 KHz test signal.

TRAD is for wire-bound ground communication (not used).

The red warning light indicates radio failure. Press lamp to test.

ME 2 Radio Control Unit

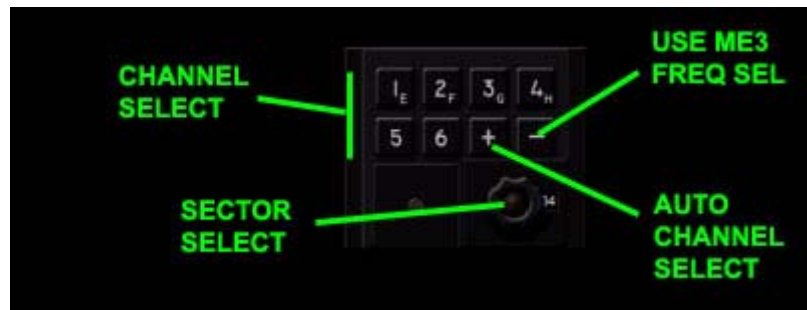


Fig. 19 ME 2 Radio Control Unit

The ME 2 panel has eight keys and a dial to select STRIL data communication channels for FR 21.

The plus key sets automatic channel selection (default).

The minus key disables the channel selector, and instead **ME 3** sets the frequency for FR 21.

NOTE: The STRIL system is not implemented, so this panel does absolutely nothing at the moment.

INSTRUMENT PANEL AND SYSTEMS**Nav Radio Panel (NAV1)**

Fig. 20 Nav Radio Panel

The Swedish Draken versions were not equipped with VOR/ILS. For practical reasons I added a **Nav Radio Panel**, a Collins-like tuning unit similar to units found in the export Drakens. I also hooked up the Flight Director to VOR/ILS. You switch between the PN-59 nav system and standard VOR navigation with a toggle switch on this panel.

NOTE: The Flight Director and Course Indicator have a slightly different behavior in PN-59 mode.

See [PN-594 navigation radar](#) and [FLI 35 system](#) chapters for an explanation of the original navigation systems in J 35J.

SSR Transponder

Fig. 21 SSR Transponder

Table 2: Transponder control panel

ON	Normal mode (default).
STBY	Transponder on but not transmitting.
LO	Transponder sensitivity reduced with -14dB.
IND	Push button to enhance the signal from the aircraft for identification.
RPLY	Indicates query/reply transmission
MON/0/TEST	MON = RPLY indicator lit on query/reply 0 = RPLY indicator disabled TEST = Test RPLY indicator (steady light)
ALT/OFF	Altitude transmit on/off

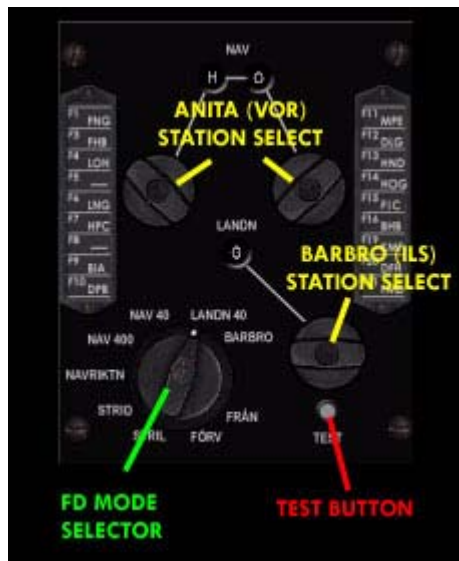
INSTRUMENT PANEL AND SYSTEMS**PN-594 navigation radar**

Fig. 22 PN-59 Panel

The Swedish J 35J had no VOR/ILS capability, instead it used a query/reply radio navigation system called **PN-594**. A query signal was transmitted from the aircraft to a ground station; the response signal was processed by the on-board computer and used by the Flight Director and Course Indicator.

A number of ground stations (in Sweden) can be selected with three code dials on the **PN-59 Panel**. The first two dials select a long-range localizer station called *Anita*, roughly corresponding to VOR. The third dial selects a close-range instrument landing station called *Barbro*.

See [Appendix 2 – NAV Channels](#) for a complete list of codes, stations and frequencies.

Flight Director Mode Selector

NAVRIKTN, NAV400 and NAV40 modes use Anita stations and can be regarded as VOR/DME (NAVRIKTN has no DME).

LANDNING 40 mode uses Barbro stations and is the equivalent of ILS, but with a computed intercept path that guides you to an optimal approach.

BARBRO mode is a backup ILS mode without glide slope.

Table 3: FD Mode Selector

FRÅN	Off
FÖRV	Standby mode
STRIL	Navigation data from mission control ¹
STRID	Radar/combat mode (not used)
NAVRIKTN	VOR
NAV400	VOR + DME, range 0–400 km
NAV40	VOR + DME, range 0–40 km
LANDN40	ILS with plotted intercept path
BARBRO	LLZ only (no glide slope)

1. In this version, FLI 35 waypoints are used. See [FLI 35 system](#).

To test the Flight Director, select NAVRIKTN and push the TEST button. The vertical crossbar should center on the radarscope.

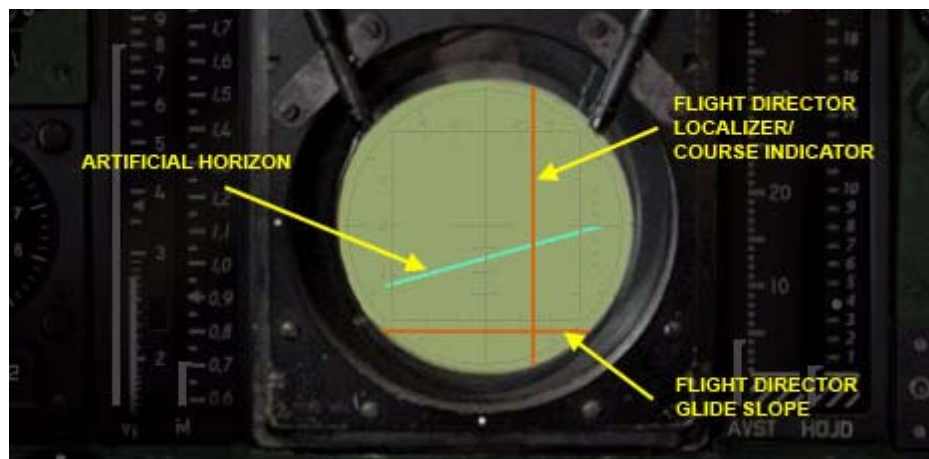


Fig. 23 Radarscope with Flight Director

INSTRUMENT PANEL AND SYSTEMS**Autopilot**

Fig. 24 Autopilot Control Panel

The autopilot in J 35J is **very** different from the standard FS9 autopilot. The master switch is sealed in the TILL (On) position, and should only be switched off in an emergency. You fly with manual input in the pitch damping mode (DÄMPN). Switching it off completely will make the aircraft unstable in pitch.

The FS9 keyboard command **AUTOPILOT MASTER ON/OFF** will **not** disconnect the autopilot, only switch to pitch damping mode. The only way to switch off the autopilot completely is to click on the Master Switch.

In case of malfunction, or if the autopilot master switch is switched off, the STYR AUT warning light on the Annunciator Panel will be lit.



Under certain conditions the autopilot will automatically cancel altitude or attitude hold, and switch to DÄMPN (manual flight). No acoustic warning is given, so keep an eye on the autopilot panel indicators.

Autopilot modes

HÖJD = Altitude hold. The aircraft will lock to the current altitude with wings level. The **Altitude Hold Light** will flash until you are stable on that altitude, then it will show a steady light. The SVÄNG (Turn) knob will bank the aircraft left/right in 15 degree increments.



Fig. 25 Altitude Hold Light

ATT = Attitude hold. The aircraft will hold the current pitch attitude with zero roll angle. The NOS NED-UPP (Pitch) lever will adjust pitch up/down in 1 degree increments. The SVÄNG (Turn) knob will bank the aircraft left/right in 15 degree increments.

DÄMPN = Pitch damping only. Default mode, always on in manual flight to prevent PIO.

Trim knobs



Fig. 26 Roll and yaw trim knobs

The knobs **ROLL** and **GIR** (Yaw) on the Autopilot Panel will adjust roll and yaw trim in 10 % steps. Trim will affect the control surfaces regardless of autopilot status, and is added to the current roll/yaw attitude in HÖJD and ATT modes.

INSTRUMENT PANEL AND SYSTEMS**Autopilot Override**

Large movements of the joystick will override HÖJD and ATT modes, and switch to DÄMPN mode (manual flight).

Caging the attitude indicators will cancel HÖJD and ATT modes.

HÖJD and ATT modes are canceled if the aircraft is in the transsonic range (M 0.95–1.05), and/or if G force is above 4 G or below -0.5 G. The autopilot will switch to DÄMPN mode, and the Altitude Hold Light will flash.



Fig. 27 Autopilot override test switch

The high/low G autopilot override function can be tested by pushing the switch PROV ACCMET BRYT, located on the panel to the right of the Annunciator Panel.

Autopilot Test Panel

The autopilot test panel, located on the right wall of the cockpit, has not been implemented in this version.

Electrical System

The electrical system has a 200 Volt A/C bus and a 29 Volt D/C bus. The normal power source is an alternator driven by the engine. The alternator has a regulator which keeps AC voltage and frequency constant regardless of engine speed.

A backup alternator is connected to the EPU ram air turbine.

Before the engine is started, power is usually supplied from the ground. In this simulation we use the battery for this purpose.

The ELFEL warning light is lit if D/C bus voltage falls below 27 V. A/C bus failure is indicated on the [Airspeed/Mach Indicator](#).

Table 4: Electrical system specs

Alternator	200 VAC/400 Hz/20 kVa
Emergency alternator	200 VAC/400 Hz/3.5 kVa
Power consumption (typical)	16 kVa
Battery bus	24 VAC/6.5 Ah
Main AC bus	200 VAC
Main DC bus	29 VDC
Instrument bus	45 VAC

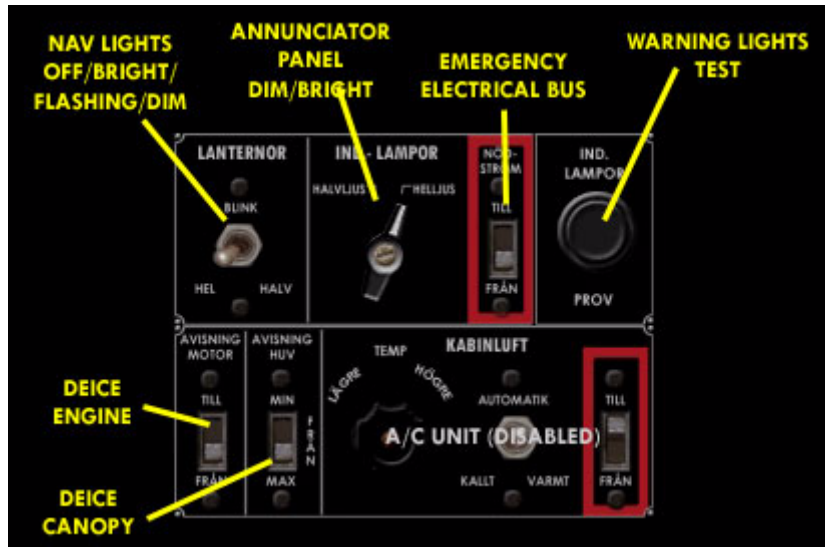
INSTRUMENT PANEL AND SYSTEMS**Electrical panels**

Fig. 28 Electrical Panels 1 and 2

LANTERNOR

A four-way switch for the navigation lights. Center position is OFF, HEL means bright, HALV means dimmed, BLINK means flashing (which was never used AFAIK).

IND LAMPOR HALVLJUS/HELLJUS

Toggles light intensity for the warning/indicator lights. HELLJUS means bright, HALVLJUS means dimmed.

IND LAMPOR PROV

Lights up all warning/indicator lights when pressed.

NÖDSTRÖM

Emergency electrical bus. In case of alternator failure, the EPU will deploy automatically and the backup alternator will be tied to the main bus. Toggling this switch will do it manually.

See also [Emergency Power Unit](#).

AVISNING MOTOR/AVISNING HUV

De-icing for engine and canopy. Engine de-ice should only be used before take-off. The green control light MOTOR IS on the annunciator panel indicates that engine de-ice is activated.

The canopy de-ice switch has three positions with OFF in the middle. Canopy de-ice should be switched on at descent and approach.

The climate controls have no function in this version.

Circuit breakers

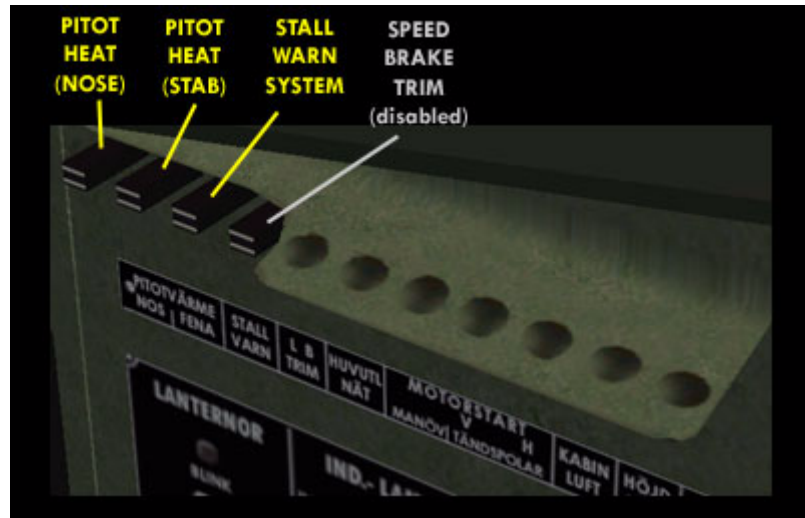


Fig. 29 Circuit breakers (Virtual Cockpit)

Only the first four circuit breakers can be operated in this version. They function as switches for nose and stab pitot heating, Stall Warning System, and Speed Brake Trim. The other circuit breakers are permanently on in this version.

All circuit breakers should normally be ON in flight. UP means ON.

! • The Stall Warning alert will not function unless the STALL VARN circuit breaker is on. Always check the circuit breakers before take-off.

Speed Brake Trim (LB TRIM) engages the upper speed brakes to work in conjunction with the elevons, to counter the effects of high dynamic pressure at high speed/low altitude conditions. When Speed Brake Trim is active, adjusting pitch trim will affect the position of the upper speed brakes.

Speed Brake Trim is not enabled in this version.

INSTRUMENT PANEL AND SYSTEMS**Interior lights**

Fig. 30 Cockpit Lighting Panel

Interior lights, panel lights and instrument lights are controlled with a toggle switch and two rheostats. In this version, the rheostats work as switches, so they only have two positions: On/Off.

Panel lights are not implemented in this version. Switching on interior lights will illuminate the cockpit including the panels.

NOTE: Interior lighting does not work in the VC. Not yet anyway.

Hydraulic system

The hydraulic system has three pumps feeding two circuits, each with 210 kp/cm² system pressure (20 MPa):

Table 5: Hydraulic system circuits

Circuit	Pump	Consumers
I	1/2	Gear, wheel brakes, exhaust nozzle, speed brakes, autopilot, control surface servos
II	3	Nose gear steering, control surface servos

Each hydraulic circuit has a corresponding warning light on the Annunciator Panel:

HYD I is lit if the pressure in circuit 1 falls below 5 MPa.

HYD II is lit if the pressure in circuit 2 falls below 15 MPa.

When the aircraft is on the ground, there is no hydraulic pressure before the engine is started. All control surfaces (including air brakes) are inoperable, and the elevons are fully deflected downwards. When the engine spools up, the elevons will slowly rise to neutral position and all control surfaces become operable.

In the air, the **Emergency Power Unit** will supply hydraulic pressure provided that the aircraft has enough airspeed.

NOTE: When throttle is at Ground Idle the pumps will not supply enough pressure to fully deflect the elevons. Moving the stick to its end positions will trigger a HYD II warning, and the Emergency Power Unit will be extended.

Fuel system

Fuel consumption and capacity



Fig. 31 J 35J with four external tanks

The J 35J has two internal tank groups, forward and rear, holding 1430 litres each. Four external tanks with 525 litres each can be added, two under the fuselage and one on each outer wing pylon.

The external tanks can be jettisoned with the FS9 key commands **DROP TANKS 1** (belly) and **DROP TANKS 2** (wing). See also [Drop tanks](#).

NOTE: The forward and rear tank groups are listed as tanks **Center** and **Center 2** in the fuel setup dialog.
The drop tanks are listed as **External 1** (belly tanks) and **External 2** (wing tanks).

Table 6: Fuel consumption (typical)

Ground Idle	140 lit/h (250 lb/h)
Full Military Thrust (low alt)	11000 lit/h (19400 lb/h)
Max Thrust with Afterburner	24000 lit/h (42300 lb/h)



WARNING!

Do not fly inverted or with negative G force for more than 20 seconds. The fuel system will not be able to supply fuel evenly, resulting in flameout.

Fuel distribution

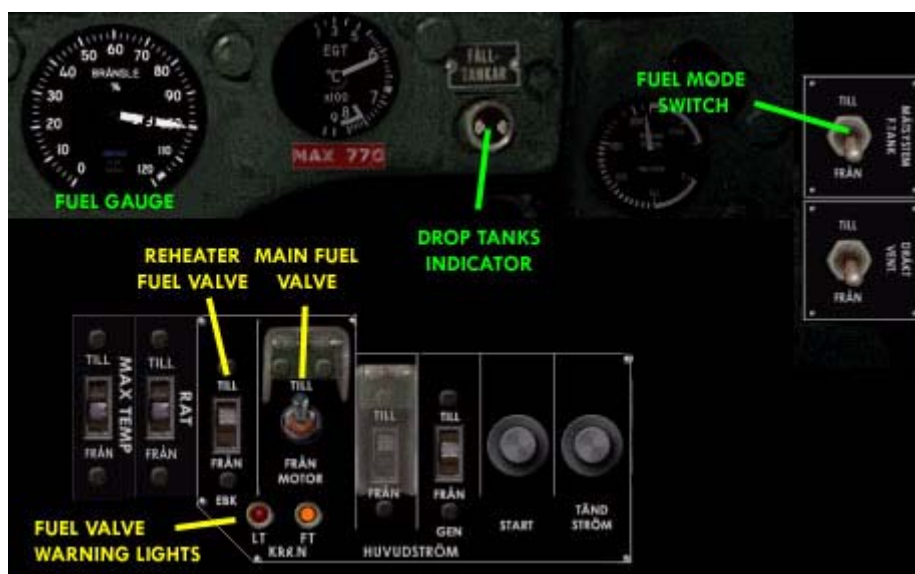


Fig. 32 Fuel system

Switches **LT MOTOR** and **EBK** on the Engine Panel control the main fuel valves for engine and afterburner. They should (of course) always be on in flight. See also [Quick Start](#).

The fuel distribution system has two modes, selected with the Fuel Mode switch **MÄTSYSTEM FTANK** on the right side of the cockpit.

If the switch is **FRÅN** (off), fuel is supplied from the main tanks, alternating between front and rear groups. The fuel gauge needles for forward (F) and rear (B) groups should never differ more than 5%.

If the switch is **TILL** (on), fuel is supplied from the external tanks until they are empty, then from the main tanks. The fuel gauge indicates the level of remaining fuel in the external tanks, with 40% as maximum (80% with wing tanks).

The Drop Tanks Indicator shows two white fields as long as there is fuel in the external tanks. When the external tanks are empty, the external fuel valves are closed and the main tank valves are opened. The fuel gauge will automatically switch to measuring the main tanks.



The Fuel Mode switch must be OFF when starting the engine, otherwise the main tanks will not be available after engine start.

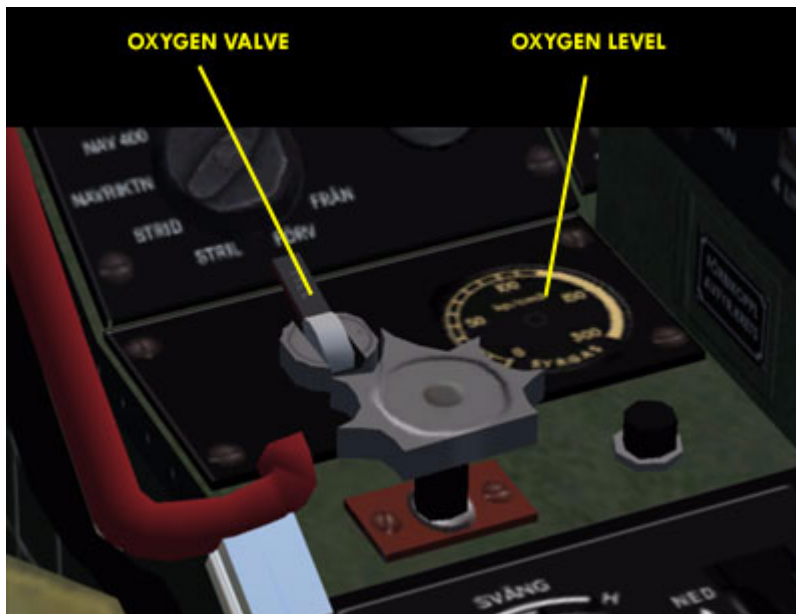
INSTRUMENT PANEL AND SYSTEMS**Oxygen system**

Fig. 33 Oxygen Control Panel

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 (VC only). 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/cm².

Engine Panel

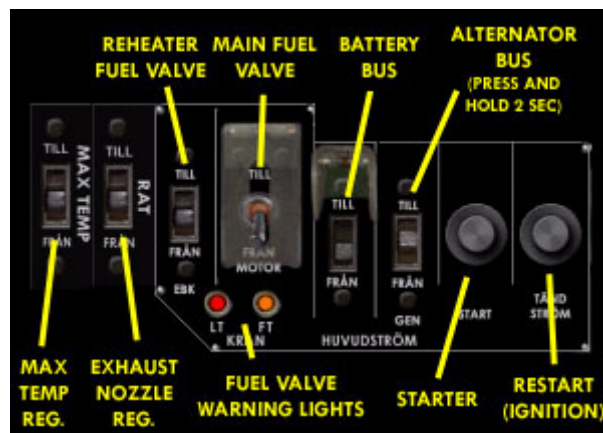


Fig. 34 Engine Control Panel

The [Quick Start](#) chapter contains detailed instructions on how to use this panel. A few reminders though:

The afterburner will not ignite unless **LT EBK** (Reheater Fuel Valve) is switched on.

The **FT** light warns you that the drop tank fuel valves are closed. See [Fuel system](#).

The **GEN** (alternator) switch is spring-loaded, and will not operate unless engine rpm is above 30%. Push and hold TILL 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 the fuel flow if the exhaust gas temperature exceeds 750 °C.

The Exhaust Nozzle Regulator **RAT** reduces thrust to prevent overheating when the aircraft is on the ground and throttle is at Flight Idle (~55%) or less, by opening the exhaust nozzle eyelids fully.

RAT is automatically disabled as soon as throttle exceeds Flight Idle and/or the aircraft is airborne.

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

Emergency Power Unit



Fig. 35 Emergency Power Unit

The Emergency Power Unit (EPU) is a ram-air turbine driving a backup alternator and a hydraulic pump.

The EPU will deploy automatically when hydraulic pressure drops or the alternator bus is powerless. It can also be deployed manually by toggling the NÖDSTRÖM switch on the Electrical Panel. Make sure that this switch is off in normal flight. When the switch is on, the warning light ELFEL is lit on the Annunciator Panel.

The backup alternator supplies 3.5 kVA and is tied automatically to the main AC bus when the EPU is deployed. The backup hydraulic pump has enough capacity to supply the more crucial functions.

The EPU turbine has a distinct sound. If you hear a propeller-like sound in flight, check if the alternator bus is off, or the NÖDSTRÖM switch is on. Or just steer away from that Cessna on your left. ;o)

NOTE: The EPU will only supply electrical and hydraulic power if airspeed is sufficiently high to drive the turbine!

Stall Warning System



Fig. 36 Stall Warning System

The Stall Warning System has two levels: **NORMAL** and **TIDIG** (early).

In Normal mode, the stall warning alert will sound 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.

INSTRUMENT PANEL AND SYSTEMS

Drag Chute Indicator

The Drag Chute Indicator is located on the throttle quadrant, and has three positions:

Table 7: Chute Indicator

	Chute stowed (ready to deploy)
	Chute deployed
	Chute released (dropped)

The indicator – and the chute release system – is all mechanical, so it will work even without electrical power.

The drag chute is controlled with the **INCREASE/DECREASE FLAPS** command. Clicking **INCREASE FLAPS** once will deploy the chute. Second click will release (drop) the chute. Third click will reset the chute – not realistic but very useful.

The drag chute is not designed for speeds greater than 320 kmh. Deploying the chute above 250 kmh will release it immediately.

To avoid damage to the chute chords, you should release the chute as soon as the aircraft has slowed enough to use wheel brakes.

In this version, the chute will automatically be released when ground speed is below 70 kmh.

NOTE: A mechanical lock prevents the chute lever from being operated when throttle is above 89%.

9 Radar

Description

This is a **very** simple simulation of the Ericsson PS-011/A radar used in J 35J. Range and mode settings are roughly the equivalent of what you find in the real Ericsson radar. Targeting is not implemented in this version.

The radar module is built on Arne Bartels' Traffic Radar source code, modified and recompiled by me. The module should not conflict with the original *TrafficRadarXML.dll* if you have it installed.

You can select either B-scope or F-scope display¹. In reality, the radar would switch display modes depending on the situation and data from mission control (STRIL). You were able to override this with a test switch – which I am using here for display mode select.

The radar has two distance ranges, 16 km and 40 km, and two sweep widths, 20° and 60°. Antenna height (elevation) can be adjusted, but it has no effect in this version. There is no ground clutter anyway!

NOTE: The radar only transmits in the air. On the ground, the radar is automatically switched to standby.

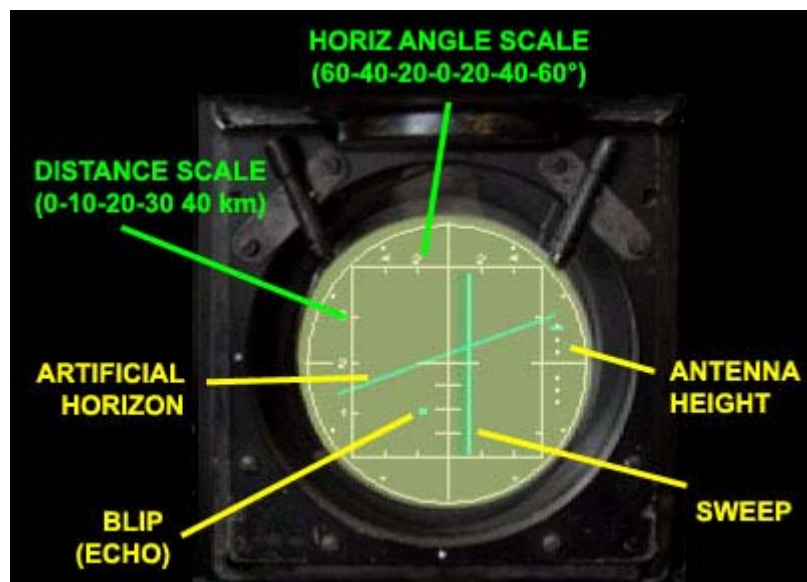


Fig. 37 Radarscope

-
1. B-Scope = Display X/Y is target bearing/distance
F-Scope = Display X/Y is target horizontal/vertical angle

RADAR**Radar controls**

Fig. 38 Radar Control Panel



Fig. 39 Weapons/Radar Control Panel



Fig. 40 Radar Hand Control

10 Armament

Loadout Configuration Panel

J 35J armament (which is what you get in this version) comes in nine loadout configurations, named **J1** to **J9**. In addition, you can choose between three different Sidewinder models.

Table 8: Loadout alternatives

J1	2 Rb 27 (Radar-homing Falcon), 2 Sidewinders
J2	1 Rb 27, 1 Rb 28 (IR-homing Falcon), 2 Sidewinders
J3	2 Rb 28, 2 Sidewinders
J4	1 Rb 28, 3 Sidewinders
J5	1 Rb 27, 3 Sidewinders
J6	Wing tanks, 2 Sidewinders (separate model)
J7	6+6 13.5cm A-G rockets, 2 Sidewinders
J8	2+2 13.5 cm A-G rockets, 2 Sidewinders
J9	19+19 7.5 cm A-A rockets (pods), 2 Sidewinders
Rb 24	AIM-9B
Rb 24J	AIM-9J
Rb 74	AIM-9Li (Swedish improved AIM-9L)

You select these presets from the nifty **Loadout Config Panel**:



Fig. 41 Loadout Configuration Panel

ARMAMENT**Selecting weapons**

NOTE: Although weapons can be mounted and selected, they can not be launched. This is not a combat sim. I know that this can be achieved in FS9 with effects and animation, but it is really beyond the scope of this freeware project. Sorry.

Weapons are selected from the Weapons/Radar Panel. You can also quick-select cannon or RR/IR missiles from the Radar Hand Control (RHC), which then overrides the current selection. Changing position of the Weapons Selector will cancel the RHC selection.

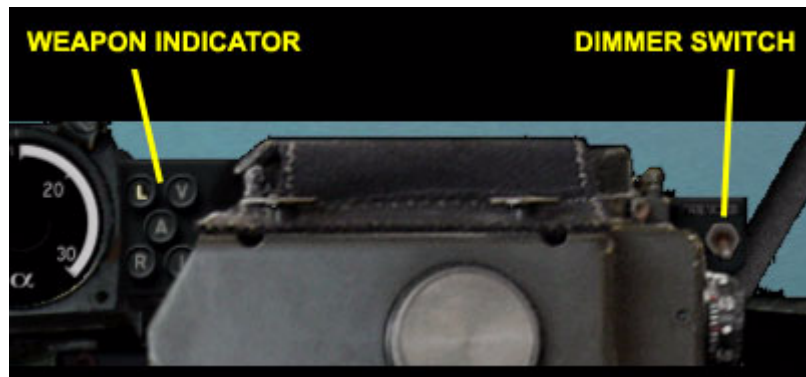


Fig. 42 Weapons selection

Table 9: Weapons Selector (J 35J)

FRÅN	OFF
RB 24	Sidewinders, single shot
AKAN	30 mm Aden Gun
FÖLJN	Radar tracking mode (no weapons selected)
RR	Rb 27 (Radar-homing Falcon), single shot
IR	Rb 28 (IR-homing Falcon), single shot
RAK+RB 24 SERIE	All rockets or all Sidewinders
RAK+ RB 24 IMP	Rockets or Sidewinder single shot

Weapon Indicator



The Weapon Indicator indicates which weapon is currently selected. The indicator can be dimmed for night flying.

Table 10: Weapon Indicator

L	Sidewinders on inner wing (air intake) pylons
V	Sidewinders on outer wing pylons
A	Cannon
R	Radar Falcon
I	IR Falcon

ARMAMENT

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11 Emergency Procedures

HYD I or HYD II warning

1. Autopilot off
2. RAT – FRÅN (Off)
3. Approach nearest airfield ASAP
4. Extend gear and lock it with NÖDLUFT LANDSTÄLL (gear emergency air lever)



Fig. 43 Gear emergency air lever

5. After TD, use drag chute to brake
6. Shut off engine when nose wheel is on the runway

EMERGENCY PROCEDURES**Flameout**

1. Press TÄNDSTRÖM (Restart) for 2 seconds.
2. Throttle between 55% and 100%.
3. NÖDSTRÖM (Emergency Power) TILL (On).
4. Maintain M 0.75–0.80 if possible.

When engine starts and rpm is above 30 % :

5. GEN (Alternator) TILL (On).
6. NÖDSTRÖM FRÅN (Off).

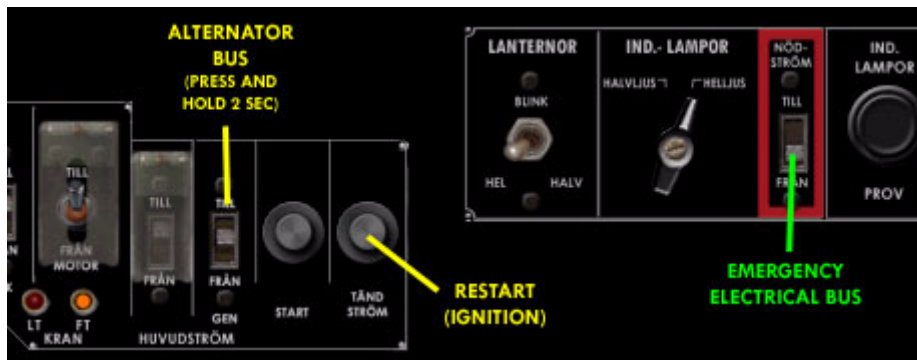


Fig. 44 Engine restart

12 Version history

3.1 – JANUARY 2007

Only released on BMFS.

- Completely reworked flight dynamics
- Radar functionality and display improved
- AOA meter needs airspeed to work
- XML code optimized in several gauges
- New engine sound
- Small cosmetic exterior/interior changes
- Three more Austrian paints

3.0 – SEPTEMBER 2006

Released on BMFS, AVSIM and FSCom.

- Functioning AI/MU radar (thanks to Arne Bartels)
- Updated radio stack
- New loadout config system
- Weapons indicator (J 35J mod)
- Fully functional FLI35 navigation
- Simulated STRIL guidance
- VC and 2D instrument lighting improved
- More realistic ground effect
- etc. etc.

2.5 – MAY 2006

Only released on the Bookmark website (BMFS).

- Improved lift at speeds 245–290 kmh
- Better VC textures (no MIPS)
- GPS/Nav waypoint info display
- Automatic gyro drift compensation
- ATC auto-tuning of COM and XPND
- Roll and yaw trim on autopilot
- PN-59 navigation system improved
- New RPM and G-meters
- Chronometer now fully functional
- G limit acoustic warning added
- Autopilot altitude hold now works
- Drop tanks animation changed
- Annunciator panel updated
- Automatic emergency bus
- Rear fuselage part redesigned
- New repaint kit, better mapping

VERSION HISTORY**2.41 – MARCH 2006**

Released on the Bookmark website as well as on AVSIM, FSCom, Simviation, and a number of other major and minor flightsim websites.

- Essentially version 2.4 but with some minor bug fixes and amendments to the help file.

2.4 – MARCH 2006

Only released on the Bookmark website.

- Extensively rebuilt version with new engine, new FD, loadout selection panel, EGT regulator (MTR), exhaust nozzle control (RAT), new navigation system, new radios, etc, etc.

2.3 – JANUARY 2006

Only released on the Bookmark website.

- An “intermediate” version with many new/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.

2.2 – DECEMBER 2005

Released on the Bookmark website, AVSIM and FSCom.

- First complete package with original aircraft model, flight dynamics, panel, sounds and effects. Also contained the first real Repaint Kit in Photoshop format.

2.1 – JUNE 2005

Only released on the Bookmark website.

- Version 2.0 minus some bugs, plus effects.

2.0 – MARCH 2005

Released on the new Bookmark website, AVSIM and FSCom.

- Complete rebuild of instrument panel, sounds, and flight dynamics for FS2004. Everything was re-coded in XML (*.cab gauge file).

1.2 – MAY 2002

Released on AVSIM and FSCom.

- Final version of the panel and flight dynamics for FS2002.

1.1 – APRIL 2002

- Experimental version, not publically released.

1.0 – APRIL 2002

Released on AVSIM and FSCom.

- Instrument panel and flight dynamics for FS2002. No external model or sounds.
Coded in C programming language (*.gau gauge file).

13 Final words, credits, etc.

Thanks to...

...my faithful beta testers, no longer listed here since several of them have asked to be anonymous.

...the hundreds of other people who have registered at my website and participate in the forums.

...*Doug Dawson* for letting me include his excellent configuration and sound gauges in this package.

...*Arne Bartels* for creating the great TrafficRadar module and putting it in the public domain.

...the enthusiasts in the AVSIM and FSCom forums for researching all the stuff that Microsoft “forgot” in the SDK.

...the dedicated people at *F10 Kamratförening* and the *Air Museum* in Ängelholm, Sweden for invaluable help and encouragement.

...the generous people who send me money through PayPal – keeping the support website open and my morals up.

Very special thanks go to my family for letting a grown man play with airplanes instead of washing the car, mending the roof, or painting the fence. Or whatever it is that grown-ups do.

Feedback and support

Registering at <http://lightsim.bookmark.se> 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 reach me through this website anytime.

Happy flying!



FINAL WORDS, CREDITS, ETC.

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14 Appendix 1 – COM Channels

The **ME 1** com radio control unit has 350 pre-set frequencies for Swedish air bases/airports, which are set by selecting the air base number and pressing one of five keys. The frequency can also be set manually with the knobs next to the frequency display.

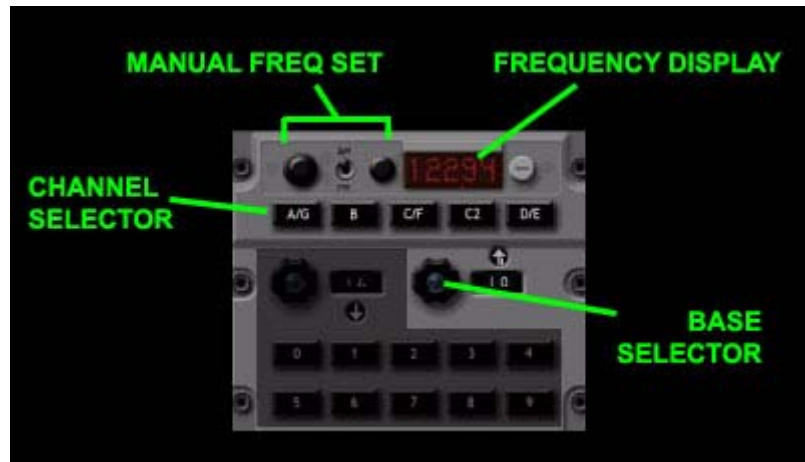


Fig. 45 ME 1 Radio Control Unit

- A** Tower
- B** PAR
- C** TMC (Terminal Control)
- C2** TMC (alternate)
- D** RRC/RSR (Regional Control)

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

G	General tower channel	122.00 MHz
F	General control channel	123.30 MHz
E	MILMET (meteorological information)	122.60 MHz

NOTE: TWR channels are correct in FS9; the other channels might or might not work. ALLM channels usually do not work. ATC will not be available at all airfields.

APPENDIX 1 – COM CHANNELS

CHN	Airport/Air Base	ICAO	CHN	Airport/Air Base	ICAO
1	Västerås	ESOW	36	Moholm	ESFM
2	Arlanda	ESSA	37	Råda	ESFR
3	Malmen	ESCF	38	Jönköping	ESGJ
4	Östersund	ESPC	39	Gävle	ESSK
5	Ljungbyhed	ESTL	40	Saab	ESSL
6	Karlsborg	ESIA	41	Kungsången	ESSP
7	Såtenäs	ESIB	42	Björkvik	ESKX
8	Barkarby	ESKB	43	Visby	ESSV
9	Säve	ESGP	44	Borlänge	ESSD
10	Ängelholm (Barkåkra)	ESDB	45	Bromma	ESSB
11	Skavsta	ESKN	46	Eskilstuna	ESSU
12	Kalmar	ESMQ	47	Örebro	ESOE
13	Bråvalla	ESCK	48	Tierp	ESKT
14	Halmstad	ESMT	49	Gimo	ESKA
15	Söderhamn	ESNY	50	Strängnäs	ESKS
16	Uppsala	ESCM	51	-	-
17	Ronneby	ESDF	52	-	-
18	Tullinge	ESCN	53	Karlstad	ESOK
19	Arboga	-	54	Sundsvall	ESNN
20	Kristianstad (Everöd)	ESMK	55	Örnsköldsvik	ESNO
21	Kallax	ESPA	56	Kramfors	ESNK
22	Sturup	ESMS	57	Kubbe	ESNI
23	Sjöbo	ESFJ	58	Sättna	ESNT
24	-	-	59	Färila	ESNF
25	Knislinge	ESFI	60	Storuman (Gunnarn)	ESUD
26	Byholma	ESFY	61	Heden	ESPJ
27	Växjö (Uråsa)	ESFU	62	Vidsel	ESPE
28	Hultsfred	ESSF	63	Kiruna	ESNQ
29	Hagshult	ESMV	64	Skellefteå	ESNS
30	-	-	65	Umeå	ESNU
31	Kosta	ESFQ	66	Fällfors	ESUF
32	-	-	67	Åmsele	ESUA
33	Landvetter	ESGG	68	-	-
34	Lidköping	ESGL	69	Jokkmokk	ESNJ
35	Hasslösa	ESFH			

15 Appendix 2 – NAV Channels

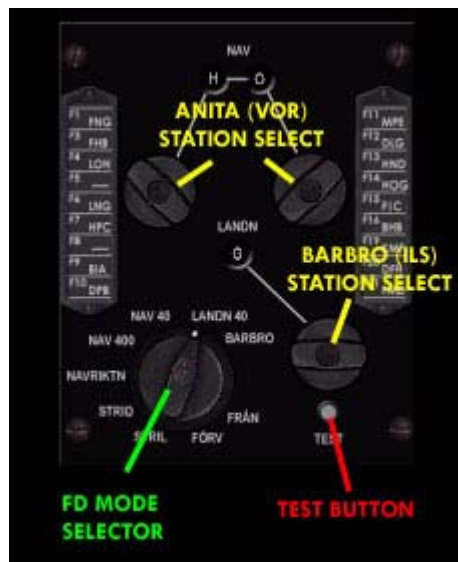


Fig. 46 PN-59 Panel

The optional **Military Nav aids Scenery** installed with this package allows you to use the PN-594 system for navigation in Sweden.

The scenery is installed in the FS9 Addon Scenery directory, but it is not activated. You have to activate the scenery through the Scenery Library settings to use it. Refer to the FS9 manual for instructions on how to activate new scenery.

The first two dials on the PN-59 Panel select a long-range localizer station called ANITA, corresponding to VOR. The third dial selects an instrument landing station called BARBRO.

The location of these stations in the scenery are real, but authentic frequencies are not used since FS9 only allows frequencies between 108.00 and 119.75 in 0.25 MHz increments.

Waypoints for the FLI-35 system have been added in this version and are listed in the table below. Please note that this function is still experimental.

NOTE: The PN-594 navigation system is there to add some extra realism when flying in Sweden. You don't *have* to use it, the normal VHF NAV radio works perfectly well.

APPENDIX 2 – NAV CHANNELS

Airport/Air Base		ICAO	NAV	LANDN	RWY	HDG	Waypoint #
Västerås	F1	ESOW	F N	G	19	191	9001
Arlanda	-	ESSA	-	-	-	-	9002
Malmen	F3	ESCF	F H	B	01	018	9003
Östersund	F4	ESPC	L O	H	12	114	9004
Ljungbyhed	F5	ESTL	- -	B	29L	294	9005
Karlsborg	F6	ESIA	L N	G	06	065	9006
Såtenäs	F7	ESIB	H P	C	19	184	9007
Barkarby	F8	ESKB	- -	A	24	243	9008
Säve	F9	ESGP	B I	A	19	185	9009
Ängelholm (Barkåkra)	F10	ESDB	D P	B	14	136	9010
				H	32	316	
Ängelholm (Markaryd)	-	-	F G	-	-	-	-
Skavsta	F11	ESKN	M P	E	26	263	9011
Kalmar	F12	ESMQ	D L	G	16	152	9012
Bråvalla	F13	ESCK	H N	D	15	147	9013
Halmstad	F14	ESMT	H O	G	19	185	9014
Söderhamn	F15	ESNY	F I	C	30	311	9015
Uppsala	F16	ESCM	B H	B	08	071	9016
	F20			D	21	209	
Ronneby	F17	ESDF	K M	F	19	188	9017
Tullinge	F18	ESCN	D H	F	24	245	9018
Kristianstad (Everöd)	-	ESMK	B E	D	19	187	9020
Kallax	F21	ESPA	F M	D	14	137	9021
Växjö (Uråsa)		ESFU	- -	H	16	159	9027
Hultsfred		ESSF	O P	A	30	295	9028
Hagshult		ESMV	G M	C	22	222	9029
Visby		ESSV	D I	A	21	201	9043
Borlänge		ESSD	H I	-	-	-	9044
Eskilstuna		ESSU	- -	B	18	176	9046
Kramfors		ESNK	BM	D	35	349	9056
Storuman (Gunnarn)		ESUD	G P	E	33	329	9060
Heden		ESPJ	- -	C	12	113	9061
Vidsel		ESPE	M O	A	29	295	9062
Kiruna		ESNQ	G I	H	21	210	9063
Jokkmokk		ESNJ	B L	G	32	320	9069

16 Appendix 4 – Check Lists

These check lists are based on real J 35J procedures, but have been adapted for use in Flight Simulator.

WL = Warning Light

TILL = ON

FRÅN = OFF

BEFORE STARTING THE ENGINE

1. Huvudström (Main Bus) — TILL
2. WL FT / LT — LIT
3. WL HUVLÅS (Canopy) — LIT
4. Canopy — CLOSE (WL HUVLÅS off)
5. Parking Brake — APPLY
6. Brake Chute Indicator — GREEN
7. Gear — DOWN, LOCKED
8. Radios — SET FREQ/CHN
9. Xponder — ON
10. RAT — AS NEEDED
11. Landing/Taxi Lights — FRÅN
12. MÅTSYSTEM FTANK (Fuel Mode) — FRÅN
13. DRÅKT VENT (Suit Cooling) — AS NEEDED
14. PN-59 — FÖRV/STRIL, SET CODE
15. STALLVARN (Stall Warning) — NORMAL
16. Oxygen — CHECK
17. Roll/Yaw Trim — CHECK/SET
18. Radar — BER
19. VAPENVÄLJARE (Weapon Selector) — FRÅN
20. Circuit breakers — ALL ON
21. AVISNING HUV (Canopy Deice) — AS NEEDED
22. KABINLUFT (Air Conditioning) — AUTO

APPENDIX 4 – CHECK LISTS**STARTING THE ENGINE**

1. LT MOTOR (Main Fuel Valve) — TILL
2. LT EBK (Reheater Fuel Valve) — TILL
3. WL LT — UNLIT
4. START — PRESS
5. EGT, starting — MAX 700°C
6. EGT, ground idle — MAX 350°C
7. Engine rpm, ground idle — 30±2%
8. GEN (Alternator Bus) — TILL (Press and hold >2 sec)
9. Annunciator Panel/WL — UNLIT (EBK lit if RAT on)
10. Master Warning — UNLIT

BEFORE TAXI

1. Canopy — LOCKED
2. Oxygen — ON
3. Radar — TILL/TYST
4. Altimeter + Stby Altimeter — SET
5. Stall Warning — TEST
6. Elevons/Rudder movement — CHECK
7. Attitude + Stby Attitude — CHECK
8. HSI — CHECK
9. Radar — AS NEEDED
10. VAPENVÄLJARE (Weapon Selector) — AS NEEDED
11. Radarscope/FD dimmers — AS NEEDED
12. With external tanks:
MÄTSYSTEM FT — TILL
13. WL FT — UNLIT
14. Annunciator Panel/WL — TEST
15. Autopilot — DÄMPN
16. Pitch trim — SET
17. AVISNING MOTOR (Deice Engine) — AS NEEDED
18. Nav Lights — AS NEEDED
19. Radios — TEST, SET N+L

TAKE-OFF

1. Nose wheel steering — CENTER
2. Attitude + Stby Attitude — CHECK
3. HSI — CHECK
4. Annunciator Panel/WL — UNLIT (EBK lit if RAT on)
5. Master Warning — UNLIT
6. Chronometer — SET INDEX TO MINUTE HAND
7. Landing Lights — ON
8. Parking Brake — RELEASE
9. Toe Brakes — APPLY
10. Throttle — 70%
11. Toe Brakes — RELEASE
12. Throttle — FULL
13. EGT — 600–750°C
14. Engine rpm — 98–102%
15. WL EBK — UNLIT
16. Afterburner — AS NEEDED
17. Airspeed Indicator — CHECK
18. Stby Airspeed Indicator — CHECK
19. Start rotation at 250 kmh.
Do not exceed 320 kmh on ground.

CLIMB AND CRUISE

1. Gear — RETRACT (MAX 400 kmh)
2. Afterburner — AS NEEDED
3. AVISN MOTOR (Deice Engine) — FRÅN (MIN 600 kmh)
4. Climb, full military throttle — Vi 850 kmh/M 0.9
Climb, afterburner — M 0.9
5. Cruise — M 0.95

APPENDIX 4 – CHECK LISTS**APPROACH AND LANDING**

1. Seat position (Viewpoint) — ADJUST
2. Stby Airspeed — CHECK
3. Stby Altimeter — CHECK
4. Speed brakes — EXTEND – reduce speed to 500 kmh
5. Gear — EXTEND/LOCK (MAX 500 kmh)
6. Gear lights — 4 GREEN
7. Brake pressure — 210 kp/cm2
8. Landing lights — ON
9. Final turn — 325–375 kmh
10. Final approach — 290–320 kmh, $\alpha=12^\circ$
11. Touchdown speed — 270–320 kmh

AFTER LANDING

1. Speed brakes — RETRACT
2. Landing lights — OFF (MAX 2 min ON when on ground)
3. Taxi lights — AS NEEDED
4. Seat position — RESET
5. Chronometer — CHECK FLIGHT TIME

SHUTDOWN

1. Parking brakes — APPLY
2. Throttle — CLOSE
3. LT MOTOR/EBK (Fuel Valves) — FRÅN
4. Canopy — OPEN
5. PN-59 — FRÅN
6. RADAR — FRÅN
7. VAPENVÄLJARE (Weapon Selector) — FRÅN
8. Transponder — STBY
9. Taxi lights — OFF
10. Navigation lights — OFF
11. HUVUDSTRÖM (Main Bus) — FRÅN

17 Appendix 5 – Swedish-English glossary

GENERAL	
TILL	On
FRÅN	Off
EBK	Reheater (Afterburner)
LUFTBROMS	Speed Brake (Air Brake)
LANDSTÅLL	Landing Gear
FÄLLTANKAR	Drop Tanks
MÄTSYSTEM FTANK	Gauge System, Drop Tanks
DRÄKT VENT(ILATION)	Suit Ventilation
HUVUDVARN)ING)	Master Warning
AVST(AND)	Distance
TIDIG	Early

ENGINE PANEL	
HUVUDSTRÖM	Main Bus
TÄNDSTRÖM	Ignition
LT (LÅGTRYCK)	Low Pressure
FT (FÄLLTANK)	Drop Tanks
KRAN	Valve

ELECTRICAL PANELS	
INSTR(UMENT) LYSE	Instrument Lights
PANEL LYSE	Panel Lights
INNER BEL(YSNING)	Interior Lights
LANTERNOR	Navigation Lights
HEL	Full
HALV	Half (Dimmed)
BLINK	Flashing
IND(IKERINGS LAMPOR	Indicator Lights
NÖDSTRÖM	Emergency Electrical Power
PROV	Test
AVISNING	De-icing
HUV	Canopy
LÅGRE	Decrease
HÖGRE	Increase
KABINLUFT	Cockpit Air
KALLT	Cold
VARMT	Hot

APPENDIX 5 – SWEDISH–ENGLISH GLOSSARY

RADAR/WEAPONS PANEL	
LJUDTRÖSKEL	Audio Threshold (for IR)
LJUSSTYRKA	Light Intensity
BELYSNING	Illumination
RASTER	Grid
KORSVISARE	Crossbars (Flight Director)
VAPENVÄLJARE	Weapons Selector

WARNING LIGHTS	
BRAND	Fire
STYRAUTOMAT	Autopilot
TANKLUFT	Fuel System Air
TANKPUMP	Fuel Pump
OLJETRYCK	Oil Pressure
SYRGAS	Oxygen
ELFEL	Electrical Fault
KABINTRYCK	Cabin Pressure
HUVLÅS	Canopy Lock
MOTOR IS	Engine (de)ice

AUTOPILOT	
STYRAUTOMAT	Autopilot
HÖJD	Altitude
ATTITYD	Attitude
DÄMPN	Damping
ROLL	Roll
GIR	Yaw
SVÄNG	Turn
TRYCK OCH VRID	Push and Twist
NOS	Nose
UPP	Up
NED	Down

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