DCS GUIDE
AJS-37 VIGGEN

By Chuck
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The Saab AJS-37 Viggen is an aircraft that was developed during the 1960’s and entered service in the Swedish Air Force in 1972. It was primarily designed as an attack aircraft with a focus on pre-planned targets, using tactics that would concentrate on a single attack on a target area with the aircraft approaching from very low altitudes (often lower than 50 m AGL) and later withdraw at very high speed. The ground radar makes the AJS-37 very flexible and able to navigate in pretty much any weather conditions, which is a big plus since it’s something quite new within the DCS World.

Saying that the Viggen is “fast” is quite the understatement. It has a superb acceleration and truly unique capabilities that very few aircraft in the world can accomplish. You will be flying at breakneck speeds at ground-level, following a meticulously planned trajectory. Flying the Viggen will show you the value of proper planning; this addition by Heatblur Simulations really opened my eyes by forcing me to take into account things that I would typically not give much of a thought before. For instance, adjusting the altimeter pressure setting is essential; all your reference points on your HUD rely on the altimeter reading, and failing to get to the target fully prepared can often generate situations where your targeting cues are off. More than once, I scratched my head trying to figure out why this bomb release cue hadn’t appeared or why it was drifting to the right during my attack run... most of the time, there is a very real, very logical reason behind it.

The Viggen is a challenging aircraft to fly. Not because it is difficult to handle, far from it. The challenge is to learn the tactics to stay alive in a hostile environment crawling with SAM sites while flying 50 meters from the ground. You will learn what “pop-up points” are, why they matter and the advantages of the Viggen in many other areas (such as its thrust reversers, which make the AJS-37 capable of landing on a dusty strip of ground in the middle of nowhere). The Swedish aircraft is the result of a practical design philosophy, sound hit-and-run tactics and technologies that allow the pilot to set many weapon parameters using a very simple interface.

You, dear reader, may look at this guide and gasp at the sheer number of pages. Don’t panic: it’s nothing close to the whole capabilities of the Viggen. I said don’t panic! The best way to go through this guide is section by section. Learn how to start up the aircraft first, map your controls. Then, learn how to takeoff and land it properly and how to set up and navigate between waypoints. Once you have that figured out, the rest of simply learning how to use the dozen weapons modelled within the sim.

It’s fun. It’s challenging. You’ll fall in love the second the afterburner kicks in.
ASSIGNING PROPER AXIS IS IMPORTANT. HERE ARE A COUPLE OF TIPS.

NOTE: IN YOUR CONTROLS, MAKE SURE YOU CHECK YOUR “TRIM” CONTROLS SINCE THE DEFAULT VERSION OF THE GAME HAS YOUR TRIM HAT SET TO CHANGING YOUR VIEW RATHER THAN TRIM THE AIRCRAFT. SINCE MOST OF YOU ARE PROBABLY EQUIPPED WITH A TRACKIR ALREADY, I SUGGEST YOU MAKE SURE THE TRIM HAT SWITCH IS SET UP PROPERLY.
BIND THE FOLLOWING AXES

- PITCH (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 0)
- ROLL (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 0)
- RUDDER (DEADZONE AT 0, SATURATION X AT 100, SATURATION Y AT 100, CURVATURE AT 10)
- THROTTLE – CONTROLS ENGINE RPM
- WHEEL BRAKE LEFT / RIGHT
WHAT YOU NEED MAPPED

PART 2 – CONTROLS SETUP

T1 Fix
(Grey button on RHS)

TO Fix

Stage 1: Trigger Safety Bucket ARM
Stage 2: Weapon Release

↑ Radarstick Up
↑ Radarstick Right
↓ Radarstick Down
↓ Radarstick Left
P TV Fix

Reference Button

↑ TRIM NOSE DOWN
↑ TRIM RUDDER RIGHT
↓ TRIM NOSE UP
↓ TRIM RUDDER LEFT

↑ ZOOM IN SLOW
↑ Obstacle Detection Mode
↓ ZOOM OUT SLOW

↑ RB05 Stick Pitch Up
↑ RB05 Stick Yaw Right
↓ RB05 Stick Pitch Down
↓ RB05 Stick Yaw Left

↑ Radar Elevation UP
↑ Radar Range Increase
↓ Radar Elevation DOWN
↓ Radar Range Decrease

↑ FR22 Push-to-Talk
↑ FR24 Push-to-Talk
↓ COMMUNICATION MENU

↓ Airbrake In
↓ Airbrake Out

← A2 Mode (3 pos switch)
← A0 Mode (3 pos switch)

↑ Radar Elevation UP
↑ Radar Range Increase
↓ Radar Elevation DOWN
↓ Radar Range Decrease

WHAT YOU NEED MAPPED

+ TOE BRAKES (MAPPED ON PEDALS)
HUD (Heads-Up Display)

HUD Reflector Glass Position Lever
PART 3 – COCKPIT & GAUGES

- Artificial Horizon
- Digital Altitude
  - In meters if under 1 km
  - In km if over 1000 m
- Pole Tracks
- Time Marker Reference Line
- Altitude Reference Bar = 100 m
- Radar Altitude Index
- Time Line
- Course Scale
  (course shown: 310)
- Airspeed Difference Indicator
  (Fin)
- Flight Path Vector
- Reticle
- +5 deg pitch reference line
- -5 deg pitch reference line
In order to understand how the track poles (vertical bars) work, we will explore three examples. For each of these examples, the **REFERENCE ALTITUDE** is set to **500 m**. Take note that you can set your own Reference Altitude by pressing the “Reference Altitude” button mapped on your stick, which will take your current altitude and make it the reference. Reference altitude may differ from waypoint to waypoint too.

The “Pole Tracks” (also called “Post Tracks”) must be seen as fenceposts forming a “track”. They are used to help you see if you are above, under or at the reference altitude.

### Case 1
**Flying over** the Reference Altitude

Track poles’ upper extremities are under the horizon line.

### Case 2
**Flying at** the Reference Altitude

Track poles’ upper extremities are aligned the horizon line.

### Case 3
**Flying under** the Reference Altitude

Track poles’ upper extremities are over the horizon line.

Using the horizontal bar as a cursor and the vertical bar as a 100 m scale, the **Radar Altitude Index** currently displays a difference of 0 m between the radar altimeter and the digital altitude calculated by the CK37 computer. This means the Altimeter Setting is set up correctly.

In the case that the HÖJD CISI switch is selected to the “LD” (barometric pressure) instead of “RHM” (radar altimeter) position AND that the altimeter setting is incorrectly set up, the index will be further up the scale and indicate a mismatch/difference between the altitude gained by the radar altimeter and the one calculated by the flight computer. By adjusting the altimeter setting and checking that the index is moved correctly at the bottom of the scale, you can make the QFE correction by using the radar altitude as a reference.
PART 3 – COCKPIT & GAUGES

- **Drysuit Ventilation Control**
  - *Kabinluft Vent Dräkt*
  - **Bypass Stores Release Mechanism**
    - *Forbik Avfynings-Krets*

- **Ignition Switch**
  - "TILL = ON"
  - "FRÅN = OFF"
**PART 3 – COCKPIT & GAUGES**

- **SA Autopilot Circuit Breaker**
- **HAV (High Alpha/Angle-of-Attack Warning) Circuit Breaker**
- **Trim System Circuit Breaker**
- **CI/SI Circuit Breaker**
- **IFF Frequency Dials**
- **IFF Channel Selector**
- **IFF Transponder Power switch**
  - **TILL = ON**
  - **FRÅN = OFF**
- **IFF Identification Button**
- **IFF Error Light**
- **IFF Test Button**
- **Function self-test (Funktionskontroll)**
- **indicator lights**
- **Engine (Motor) Circuit Breaker**
- **Ejection System (Utskj-Krets) Circuit Breaker**

**IFF Identification Button**

**Ident** button for IFF identification.

**Test** button for IFF test.

**Ident** for IFF identification.

**Test** for IFF test.

**IFF Error Light**

**IFF Response Light**
PART 3 – COCKPIT & GAUGES

- **RB-04 / RB-15 / BK-90 Release Mode Switch**
- **Weapon Release Mode Switch**
- **External Fuel Tank Release Button**
- **NODF: Emergency Weapons Release Button**
- **Weapon Selector Knob**
- **Weapon Interval Selector Knob**
**Backup Generator Switch**  
(Reservström)  
*TILL = ON*  
*FRÅN = OFF*

**Manual Afterburner Fuel Regulator (LT-KRAN EBK)**  
STÄNGD = CLOSED  
ÖPPEN = OPEN

**Indicator System (Kontroll) Test switch**

**Tank Pump Switch**  
AVST = CLOSED  
NORM = NORMAL

**Manual Fuel Regulator Switch**  
(Bransleregl)  
Manual / Auto

**Pitch Gearing Switch**  
(TIPP VÄXEL)  
*TILL = ON = Pitch Gearing Automatic Mode*  
*FRÅN = OFF = Pitch Gearing Landing Mode*

**Engine Anti-Ice Switch**  
(AVISN Motor)  
*TILL = ON*  
*FRÅN = OFF*  

**Backup Generator Switch**  
(Reservström)  
*TILL = ON*  
*FRÅN = OFF*
**PART 3 – COCKPIT & GAUGES**

- **Formation / Landing Lights (Formljus / Ledljus)**
  - Till = On
  - Från = Off

- **Brightness Control**

- **Magnetic Declination Adjustment Knob (Kurskorr)**

- **Formation Lights (Formljus)**
  - Till = On
  - Från = Off

- **Navigation Lights (Lantern)**
  - Hel = Full Intensity
  - Halv = Half Intensity

- **Anticollision Lights (Antikolljus)**
  - Till = On
  - Från = Off

- **Countermeasures Mode Selector (KB)**
  - A: Automatic
  - 0: Off
  - 1: Mode 1
  - 2: Mode 2
  - 3: Mode 3

- **Countermeasures Selector**
  - R: Chaff (Remsor)
  - RF: Chaff and Flares
  - F: Flares (Facklor)

- **Radar Warning Receiver (RWR) Mode Selector**
  - Från = Off
  - Ljus: Visual Warning Only
  - Ljus/Ljud: Visual and Audio Warning

- **Countermeasure Selector**

- **Windscreen Anti-Ice Control (Varmluftspoln Frontruta)**
  - Stängt = Closed
  - Öppet = Opened

- **Maintenance Test Mode Selector**

- **Test Switch**
  - Other Electronics (ÖVRIG ELEKTRONIK)
  - Radar
  - Countermeasures (Motmedel)

- **Jammer Operation Mode Selector**

- **Jammer Band Selector**

- **Radar Warning Receiver (RWR) Mode Selector**
  - Från = Off
  - Ljus: Visual Warning Only
  - Ljus/Ljud: Visual and Audio Warning
PART 3 – COCKPIT & GAUGES

RHM Switch: Radar Altimeter
TILL = ON
FRÅN = OFF

DME Switch: Legacy Switch (not functional)

Navigation System Waypoint Selectors
B1 to B9: Waypoints 1 to 9

Navigation System Waypoint Selector
BXL: selects a BX point (BX1-9)

Navigation System Waypoint Selector
L/MÅL: landing base or recon target

TILS (Tactical Instrument Landing System) Channel Layer Selector
1-10: Channels 1 through 10
11-20: Channels 11 through 20

RB-05 Control

Handrest

Navigation System Waypoint Selector:
LS/SKU: Take-off base or tracked target

TILS (Tactical Instrument Landing System) Channel Layer Selector
### Cockpit & Gauges

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Oxygen Lever</strong></td>
<td>TILL = ON</td>
</tr>
<tr>
<td><strong>Oxygen Pressure Indicator</strong></td>
<td>(kp/cm²)</td>
</tr>
<tr>
<td><strong>EGT (Exhaust Gas Temperature) Indicator</strong></td>
<td>(x100 deg C)</td>
</tr>
</tbody>
</table>

### Warning Panel Indicators

- **SPAK**: Autopilot failure
- **SYRGAS**: Oxygen valve is OFF or pressure in oxygen bottle is low
- **HÅLL-FUNK**: Autopilot hold function failure
- **BRÅ < 24**: Fuel amount is below 24 %
- **BRÅND**: Gas turbine starter fire
- **ROLL VÄXEL**: Roll Gearing system failure
- **TILS**: Status of TILS landing system
- **CK**: CK37 Computer Failure
- **NAV-SYST**: Navigation System Failure
- **KABINHÖJD**: Low cabin pressure
- **KB-V SLUT**: Left countermeasures pod empty
- **HUV o STOL**: Ejection seat not armed and canopy unlocked when closed
- **KB-H/KA SL**: Right countermeasures pod empty / ECM pod failure
- **TÄNDSYST**: Ignition system active
- **FACKL SL**: Flares Empty
- **STARTSYST**: Engine starter system active
- **MOTVERK**: Status of countermeasures and radar warning system
- **MAN BR REG**: Manual fuel regulator is in Manual mode
- **LUFTBROMS**: Airbrakes are extended
- **CK37**: Computer Failure
- **NAV-SYST**: Navigation System Failure
- **KABINHÖJD**: Low cabin pressure
- **KB-V SLUT**: Left countermeasures pod empty
- **HUV o STOL**: Ejection seat not armed and canopy unlocked when closed
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- **LUFTBROMS**: Airbrakes are extended
### FIRE

1-2 LIGHTS/SUSPECTED FIRE
CLOSE A/B, LOWPRESS FUEL VALVE
LOWEST POSSIBLE RPM
A/C ON FIRE?

<table>
<thead>
<tr>
<th>NO</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND ASAP</td>
<td>EJECT</td>
</tr>
<tr>
<td>A/C STOPPED</td>
<td>MAIN POWER OFF</td>
</tr>
<tr>
<td>LP FUEL VALVE OFF</td>
<td>EXIT ASAP</td>
</tr>
</tbody>
</table>

### GEN. EMERG. PWR

MAKE ONE ATTEMPT TO RE-ENGAGE
ABORT MISSION
IF PROBLEM REMAINS:
BACKUP POWER ON
ACT AS PER « GEN FAULT »
IF STILL NO A/C POWER:
GOOD WEATHER, GROUND VISUAL, WINGMAN?
FR24, LAND 15 MIN
FLY GENTLY

EXIT ASAP
PART 3 – COCKPIT & GAUGES

Backup Altimeter (HÖJD)
Thin Needle: x100 m
Thick Needle: x1000 m

Pressure Adjustment Knob

Engine N2 (High-Pressure Turbine) RPM Indicator in % (Varv)

Magnetic Course Indicator

Engine Pressure Ratio (EPR) Indicator
(Pt7/Pt2, or ratio between engine intake and exhaust pressures)

Fuel Indicator (Bränsle)
Long Needle: Fuel Quantity in %
Striped Needle: Fuel Quantity Required to complete the route as planned

Afterburner Stage Indicator
**EP-13 Indicator**
(Collimated sight for RB75)

**Clock**

**Stores Released Warning Light (FÄLLD LAST)**

**Accelerometer (G)**

**Thrust Reduce / Transonic Warning Light**

**Destination Indicator**
 Selected Waypoint ID in Number and Type

**Distance Indicator from Selected Waypoint**

**Backup Artificial Horizon**

**Back up Airspeed Indicator (x100 km/h)**

**Altitude Source Selector (HÖJD CISI)**
RHM: Radar Altimeter
LD: Barometric Altitude

**HUD (Heads-Up Display) Slave Switch**
F: OFF / T: ON

**Distance Unit from Selected Waypoint**
KM = in kilometers
MIL = in Swedish Miles
Note: 1 Swedish mile = 10 km

**PART 3 – COCKPIT & GAUGES**
TRANSLATION:
**LOSS OF THRUST AFTER TAKEOFF**
- THROTTLE TO MAX DRY

IF PROBLEM REMAINS:
- FUEL CONTROL SYSTEM: MAN
- JETTISON STORES IF NECESSARY
- DO NOT USE AUTOPILOT
- FLY GENTLY
- LAND A.S.A.P. (AS SOON AS POSSIBLE)

IF TAKEOFF CANNOT BE ACHIEVED NOR ABORTED:
- LEAVE AIRCRAFT (EJECT)
AoA (Angle of Attack) Indicator

Master Caution Lights (Huvudvarning)

Autothrottle (AFK) Mode 3 (Alpha15.5) Button/Light

Autopilot Mode Selectors/Lights
SPAK: Main dampening mode
ATT: Attitude Hold
HÖJD: Altitude Hold

Master Caution Reset Button

Airspeed Indicator (x100 km/h)

Vertical Speed Indicator (Shown: +3 m/s)

Attitude Director Indicator (ADI)

Slip Ball
PART 3 – COCKPIT & GAUGES

- Altitude Warning Light
- Central Indicator (CI) Radar Display
PART 3 – COCKPIT & GAUGES

**FR22 Radio Frequency Tuner**
- Inner Right
- Inner Left
- Outer Left
- Outer Right

**FR22 Primary Radio (VHF/UHF) Frequency Indicator**
- VHF: 103.000 – 155.975 MHz
- UHF: 225.00 – 399.95 MHz

**Thrust Reverser Light** (Lit = Deployed)
- Lever: PULLED = Deployed, PUSHED = Stowed

**Thrust Reverser Lever**
- PULLED = Deployed
- PUSHED = Stowed

**FR 22 Radio Frequency Selector (AM/FM)**

**Altimeter Pressure (QFE) Setting Knob**
- Long Needle: x 100 m
- Short Needle: x 1000 m
- Shown: 1420 m

**Altimeter (HÖJD)**
- Ex: 1013.25 Hpa = 29.92 in Hg

**Altimeter Pressure (QFE) Setting**
- Ex: 1013.25 Hpa = 29.92 in Hg
PART 3 – COCKPIT & GAUGES

Warning Panel Test Light

Landing/Taxi Lights Switch
UP = OFF  DOWN = ON

Emergency Lights Switch
UP = OFF  DOWN = ON

Indicator Light Intensity Switch
(HALV: DIMMED / HEL: FULL)
PART 3 – COCKPIT & GAUGES

Parking Brake Handle
PULLED: Brake Set
PUSHED: Brake Released

Radar Symbology Test Button
### Engine Failure
- Ground idle
- Altitude < 12 km
- Eng restart (2 sec)
- Man fuel reg < 9 km
- No rpm/temp in 20 s?
- Eng start switch
- Fly gently
- Land asap

### Compressor Stall
- Reduce AoA & G
- Maintain throttle
- Problem remains:
  - Extinguish A/B
  - Max possible rpm
  - Fly gently
  - Land asap

### Abnormal Thrust
- Fly gently
- Land asap

---

<table>
<thead>
<tr>
<th>Nozzle Position</th>
<th>Open</th>
<th>Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jettison stores (if required)</td>
<td>Flight idle, alt &lt; 9</td>
<td>Land? eject?</td>
</tr>
</tbody>
</table>

Countermeasure (KB) Dispense Switch
- Fran (off)
- Int (interval)
- Kont (continuous)
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRAND: Engine Fire</td>
<td>TIPPVÄXEL: Pitch gearing in incorrect mode based on current airspeed</td>
</tr>
<tr>
<td>BRÅ UPPF : Low Fuel Pressure Fault</td>
<td>ELFEL: Electrical Failure</td>
</tr>
<tr>
<td>X-TANK BRÅ : External Fuel Tank Feed System Fault</td>
<td>RESERVEEFF: Backup hydraulics or backup generator failure</td>
</tr>
<tr>
<td>TANK PUMP: Tank Pump System Fault</td>
<td>HYDR-TR 2: Low pressure in hydraulic system 2</td>
</tr>
<tr>
<td>LANDSTÄLL: Status of landing gear system</td>
<td>HYDR-TR 1: Low pressure in hydraulic system 1</td>
</tr>
<tr>
<td>FÖRV FÖRBJ: Thrust Reversal inadvisable due to possible fault</td>
<td>APK FEL: Autothrottle failure</td>
</tr>
<tr>
<td>NOSSTÄLL: Nose landing gear extended and locked</td>
<td>EJ REV: Thrust reverser failure</td>
</tr>
<tr>
<td>V-STÄLL: Left landing gear extended and locked</td>
<td>OLJETRYCK: Low oil pressure</td>
</tr>
<tr>
<td>H-STÄLL: Right landing gear extended and locked</td>
<td>OLJETEMP: High oil temperature</td>
</tr>
</tbody>
</table>
Cabin Pressure Indicator

Brake Pressure Indicator (x100 kp/cm²)

Pitch Trim Indicator

Roll Trim Center Switch
PART 3 – COCKPIT & GAUGES

Canopy Control Lever
AFT: OPEN
MIDDLE: NEUTRAL
FWD: CLOSE

Ignition System Selector Switch (TÄNDSYSTEM)
MAN: Manual / AUT: Automatic

Main Electrical Power Switch (HUVUDSTRÖM)
TILL: ON / FRÄN: OFF

Low Pressure Fuel Valve Switch (LT-KRAN)
TILL: ON / FRÄN: OFF

Radio Group Selector Dial and Indicator

Radio Special Modes Buttons

Radio Base Preset Buttons

Radio Group Preset Buttons

Radio Base Selector and Indicator

Starter System Switch
TILL: ON / FRÄN: OFF

Generator Switch
TILL: ON / FRÄN: OFF

Canopy Jettison Button
(NODSKJUT HUV)

Autopilot yaw correction knob
(RENFLYGNING)
PART 3 – COCKPIT & GAUGES

- **High Pressure Fuel Valve Switch** (only selectable when throttle is in IDLE or OFF position)
- **Autothrottle (AFK, or Automatisk Fart Kontroll) Quick Disconnect Button**
- **Countermeasure Quick Release Button**
- **Throttle**
- **Infrared Missile Uncage Button**
- **Airbrake Switch**
  - AFT: Deployed
  - FWD: Retracted
PART 3 – COCKPIT & GAUGES

Engine Restart Button (ATERSTART)

Pulse Length Selector
NORMAL: Normal
KORT: Short

Master Mode Selector
GREEN ARROW: Used for Maintenance
BEREDSKAP: STANDBY, but pre-warmed
NAV: Radar Display ON (only 180 sec after main generator comes online)
ANF: Radar function dependent on selected weapon
SPA: Same function as NAV
LANDN NAV: Same function as NAV
LANDN P/O: Same function as NAV

Radar Altimeter Signal Modulation Selector
LAND (Land) / SJÖ (Sea)

Radar Receiver Processing Mode Selector
Linear / Logarithmic

Passive Radar Mode Selector
TILL: ON
FRÄN: OFF
PART 3 – COCKPIT & GAUGES

Radar Mode Selector
A0: Radar OFF
A1: Radar ON, Wide Search Mode with Sector PPI
A2: Radar ON, Narrow Search Mode with B-Scope

Radar Memory (Minne) Mode Button

Radar Fix Trigger
T0: Neutral
T1: First trigger detent
TV: Second trigger detent

Radar Terrain Avoidance Selector

Radar Antenna Elevation Dial

Radar Scan Range Selector

Radar MKR Potentiometer (Amplification Gain) Dial

Anti-Jamming (AS) Filter Mode Selector
PART 3 – COCKPIT & GAUGES

Missile select button Infrared-RB (FRAMSTEGN)

Master Volume / Sidewinder Tone
PART 3 – COCKPIT & GAUGES

Ground Intercom Button

Radio Volume Tuner

Flight Recorder (MIK BAND)
TILL: ON / FRÅN: OFF

Ground Intercom Button

Emergency Pitch Trim (NÖDTRIM TIPP)
FRAMÅT: Forward
BAKÅT: Aft

Emergency Yaw Trim (SIDTRIM)
VÄNSTER: Left
HÖGER: Right

Radio Volume Tuner

FR 24 Backup Radio Mode Selector
NORM+LARM: Normal Mode, but monitoring guard frequency 121.5
H: Guard Frequency using the FR 24 Backup Radio
E/F/G: Preset emergency channels using FR 24 Backup radio
NORM: Normal FR 22 Main Radio functionality

Left/Right Console Lights Brightness

Instrument Lights Brightness

Emergency Roll Trim (NÖDTRIM ROLL)
VÄNSTER: Left
HÖGER: Right

Flood Lights Brightness (BELYSNING)

Radar Brightness Control (LUJS RADAR)
PART 3 – COCKPIT & GAUGES

Cabin Air Valve Control

Autothrottle (AFK, or Automatisk Fart Kontroll)
UP: OFF
DOWN: ON

Landing Gear Control Lever
UP: RETRACTED
DOWN: DEPLOYED

Mission Data Cartridge
PART 3 – COCKPIT & GAUGES

- FR22 Radio Transmit Button
- Trim Hat Switch
- Reference Button (for HUD altitude reference)
- Trigger (with safety cover)
- Trigger (in front of stick)
- Event Marking (no function)
1. Communicate with ground crew to set ground power ON
   a) Press the TRAD (Ground Intercom) button to communicate with ground crew
   b) Press F8 – Ground Crew
   c) Press F2 – Ground Electric Power
   d) Press F1 – ON
2. Insert Mission Data Cartridge (left side of cockpit, behind pilot seat)
3. Set Main Power switch (HUVUDSTRÖM) to TILL (ON)
4. Set Low Pressure Fuel Valve (LT-KRAN) switch to TILL (ON)
5. Cancel Master Caution Alarm by pressing the HUVUDWARNING button between the caution lights.
6. Set Radar Master Mode to BER (Standby)
START-UP

7. Press the Warning Lights Test button (KONTR LAMPTABLA) and test that the caution lights are illuminated correctly.
8. Make sure Autothrottle (AFK) is set to OFF (UP)
9. Make sure landing gear lever is set to EXTENDED (DOWN)
10. Set throttle to GROUND IDLE (MTG) position by clicking on the High-Pressure Fuel Valve switch
11. Set Generator switch to ON (TILL).
12. Click on the Autopilot yaw correction cover and set Autopilot yaw correction (RENFLYGNING) to 0.
14. Ensure Thrust Reverser lever is in the STOWED position (pushed).
PART 4 – START-UP PROCEDURE

15. Check that the ADI is aligned properly and the red warning flag is not displayed.
16. Set the HUD to the LOWER position to ensure takeoff data is properly displayed during takeoff.
17. Set HUD slave (SLAV-SI) switch to FRÅN (OFF)
18. Set CI-HUD altitude source switch to Barometric Altitude (LD).
19. Pull the Backup Artificial Horizon caging knob to uncage it.
20. Set Main Altimeter Pressure until Altitude (HÖJD) is set to 0.
21. Set Backup Altimeter Pressure until Altitude (HÖJD) is set to 0.
22. Set RWR (Radar Warning Receiver) to desired position
   • FRÅN = OFF
   • LJUS = ON: LIGHTS ONLY
   • LJUS + LJUD = ON: LIGHTS + AUDIO
23. Set lights as desired
24. Click on Magnetic Declination cover and set Magnetic Declination to:
   • +6 deg for Caucasus
   • +11 deg for Nevada.
25. Load flight plan data from the mission cartridge by setting the Data Selector knob to REF/LOLA.
26. Set INPUT/OUTPUT data switch to INPUT.
27. Enter code 9099 (Fictional Airport No. 99).
28. Press the LS waypoint to start data transfer process. The data transfer will be in-progress when the first “9” digit is flashing, and the process will be complete once all digits revert back to “0”.
29. Once data transfer is complete, set INPUT/OUTPUT data switch to OUTPUT.
30. Set Oxygen switch to TILL (ON).
31. Set RHM (Radar Altimeter Power) switch to TILL (ON).
32. Set Canopy Lever FORWARD to close the canopy.
33. Hold the START switch to TILL (ON) for 2 second to begin engine start sequence.
34. The STARTSYS caution will illuminate once start sequence has started.
35. The TÄNDSYST caution will illuminate once igniters are lighting up.
36. Once engine RPM has reached IDLE (around 58 % N2), the STARTSYS and TÄNDSYST cautions will extinguish.
37. Set Pitch Trim to 3 deg Nose Up (Nos Upp).
38. Arm Ejection Seat.
39. Press the System Indicator Test (KONTROLL) button for a few seconds to run automated system tests.
40. Set MASTER MODE to NAV to start the HUD in “Takeoff Mode”
41. Set TILS selector to AUTO.
42. Communicate with ground crew to set ground power OFF
   a) Press the TRAD (Ground Intercom) button to communicate with ground crew
   b) Press F8 – Ground Crew
   c) Press F2 – Ground Electric Power
   d) Press F1 – OFF
43. Set Taxi/Landing Lights switch to ON (DOWN)
44. Press brake pedals to release the parking brake (default: W key).
45. Start taxiing.
1. Slowly throttle up and taxi to the runway by using the rudder and toe brakes to steer the aircraft
2. Set SPAK Autopilot damper ON (press on the lamp button and it will illuminate)
3. When lined up on runway, throttle up to Afterburner ZONE 2.
4. When reaching 270 km/h, gently pull back on the stick.
5. Rotate until the Flight Path Vector is on the same level as the longest pole of the pole track and maintain it there. This will give you a 13 deg nose-up attitude.
6. Once the HUD switches automatically from TAKEOFF mode to NORMAL NAVIGATION mode above 500 m AGL (Above Ground Lever), raise landing gear UP by setting the gear lever UP.
7. Elevate reflector glass to IN-FLIGHT (upper) position.
8. Throttle back to MILITARY POWER (all afterburner zone lights are extinguished) and proceed towards your first waypoint (B1).
1. Slowly throttle up and taxi to the runway by using the rudder and toe brakes to steer the aircraft.
2. Set SPAK Autopilot damper ON (press on the lamp button and it will illuminate).
3. When lined up on runway, throttle up to Afterburner ZONE 2.
4. When reaching 270 km/h, gently pull back on the stick.
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7. Elevate reflector glass to IN-FLIGHT (upper) position.
8. Throttle back to MILITARY POWER (all afterburner zone lights are extinguished) and proceed towards your first waypoint (B1).
PART 6 – LANDING

VISUAL LANDING APPROACH (NORMAL BRAKING WITH AUTOThROTTLE)

**PHASE A: PREPARATION**

1. Look at your kneeboard by pressing “LSHIFT+K” and scroll through the kneeboard pages to the Waypoint Page using “[“ and “]” keys. Find your Landing waypoint’s QFE. In this example, we have a QFE of 1031 hPa.
2. Set the Altimeter Setting to 1031.
3. If you are not currently tracking the Primary Landing Waypoint (L1), set the Navigation Data selector to AKT POS (Actual Position) and press the L-MAL button to select the Primary Landing Site Waypoint (L1).
4. Set HUD to the DOWN (Takeoff/Landing) position and line up with the runway.
5. Reduce airspeed to 550 km/h during approach. This can be done by moving the throttle manually or by engaging the AUTOTHROTTLE lever (DOWN).

6. Pull Thrust Reverser lever to arm it.

7. Set the Master Mode to LANDNING P/O (Visual Landing PAR/Optical). The HUD will switch from NAV to LANDING mode.

8. Deploy landing gear (landing gear and flaps will deploy automatically).

9. Maintain an approach altitude of 500 m AGL (Above Ground Level).

10. Start descent by steering the flight path vector onto the alignment line.

11. Maintain a MAXIMAL AoA (Angle of Attack) of 12 deg AoA and aircraft attitude by aligning the descent line on the runway threshold. This will give you a descent angle of 3 deg.

   • Do not slow down under 260 km/h.

12. At 30 m over the runway, the Flight Path Vector will become a glideslope indicator. Keep it above the horizontal line to ensure a smooth touchdown.
13. On touchdown, resist the urge to pull on the stick: let the aircraft gently touch the ground.
14. As your main landing gear wheels touch the ground, the autothrottle will automatically disengage.
15. When your nose landing gear wheel will touch the ground, the thrust reverser flaps will deploy/engage and the thrust reverser system will produce reverse thrust.
   • Note: If thrust reversers are working, throttling up will mean increased REVERSE thrust, which will slow you down even more.
16. When main deceleration has occurred, set throttle to IDLE and use toe brakes very gently.
17. Once the aircraft has come to a full stop, disarm thrust reverser system (push lever) and taxi to parking spot.
The Viggen is equipped with many systems that aim to make your life as a virtual pilot easier. How? Mainly by reducing your workload.

Two of the most important tools at your disposal when landing the Viggen are the Autothrottle and the Thrust Reverser.

The **Autothrottle** (AFK, or Automatisk Fart Kontroll) is an automated throttle control system that has two main purposes:

1. Help you maintain a good approach airspeed (550 km/h) while your landing gear is retracted
2. Help you maintain a good landing attitude (12 deg Angle of Attack, or 15 deg Angle of Attack if the 15.5 α button is pressed) and airspeed while your landing gear is deployed

**The Autothrottle is automatically disengaged if:**

a. If the Main Landing Gear wheels are depressed (touching the ground) or
b. If you set the Autothrottle lever in the OFF position or
   c. If you push the throttle to afterburner or
   d. If you press the “IR-Missile Fast Select/AFK Disconnect” [LALT+LCTRL+S] button on your throttle

The **Thrust Reverser** is a system that deploys flaps on your engine exhaust and forces the airflow forwards, producing reversed thrust that helps you slow down on landing. Pulling the Thrust Reverser lever will arm the system, but not necessarily deploy the reverser flaps while you’re in the air. **Reverse thrust is only produced if:**

1. The Thrust Reverser is armed (lever is pulled)
2. The Main Landing Gear AND Nose Landing Gear wheels are depressed (touching the ground)

All these tools exist, but you don’t need them to land: you can do it all manually. I highly recommend that you practice with and without these systems to get a better understanding of how they work and when they are useful. To show you how the Autothrottle and Thrust Reverser work, I will include them in the procedure on the next page. Take note that you are free to do it without reversed thrust or autothrottle; it’s very much a personal decision at this point.

**See the LANDING section to learn about how these systems must be used during a landing.**
VOLVO RM8A ENGINE

The RM8A is basically a licensed-built version of the JT8D, heavily modified for supersonic speeds, with a Swedish-designed afterburner. It was produced by Svenska Flygmotor (later known as Volvo Aero). Since the original engine was constructed for subsonic speeds, most parts of the engine had to be redimensioned for the higher Mach-speeds in a military aircraft. Fans and turbine were altered, a new burn-chamber designed with a totally new fuel-control system for both engine and afterburner. The power of the engine allows the Viggen to reach speeds of Mach 2.
Engine Flameout – AIR ENGINE RESTART PROCEDURE

The Viggen may be fast, but there is “fast”, “very fast”, and “Oh-god-I’m-heading-in-a-mountain-at-Mach-1-and-my-engine-flamed-out fast”. The engine is prone to compressor stalls and surges during:

- Excessively rapid throttle movements
- High angle of attack flight (18+ deg AoA)
- High altitude flight

Here is the procedure on how to save your engine in case of an engine compressor stall:

a) Recognize a compressor stall by a sudden loss of RPM and “bang” sounds.
b) Reduce AoA (angle of attack) and g-load
c) Maintain throttle at current position
d) If compressor stall persists, reduce throttle below afterburner.

If all else fails and you end up having an engine flameout, don’t panic. Here’s what you need to do:

1. Set throttle to Ground IDLE
2. Decrease altitude below 12 km altitude
3. Press the Engine Restart (ÅTERSTART) button for 2 seconds.
4. Set Manual fuel regulator (BRÄNSEREGULATOR) to MANUAL when flying under 9 km altitude.
5. If no RPM or EGT increase within 20 seconds, set the Engine start (TILL = ON) switch (normal engine start procedure).
6. If all else fails, eject as soon as possible. You’re pretty much boned. 😊
The PS-37/A radar installed on the Viggen is a ground-mapping radar designed for targeting ships. It can be used against ground targets, however its effectiveness is entirely dependent of the contrast and target size. The radar can also be used as a navigation aid and is very closely integrated with the navigation suite. In practice, the radar will be used mainly to navigate in poor-visibility conditions or to perform low-level anti-ship operations. Sounds complicated? Don’t worry, the radar procedures are thoroughly explained in the NAVIGATION and WEAPONS sections of this guide (doing radar fixes, locking targets, etc.). This section is merely an introduction to the radar to explain what it does and how it works.
The PS-37/A radar has a range of up to 120 km depending on the flight altitude and the antenna elevation. However, even if the radar can reach 120 km, it doesn’t necessarily mean that it will spot everything precisely. That big ship you are looking for might be 120 km away, but your radar might only have radar returns 60 km away. The radar isn’t meant to be a perfect solution to find your target: a thorough flight planning has to be done before you even leave the ground.

<table>
<thead>
<tr>
<th>Scan zone range (km)</th>
<th>Flight altitude (m)</th>
<th>Antenna elevation (relative to the horizon) (±0.5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>-</td>
<td>-3.0°</td>
</tr>
<tr>
<td>30</td>
<td>&gt; 600</td>
<td>-3.0°</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 600</td>
<td>-1.5°</td>
</tr>
<tr>
<td>60</td>
<td>&gt; 600</td>
<td>-1.0°</td>
</tr>
<tr>
<td>60</td>
<td>&lt; 600</td>
<td>-0.5°</td>
</tr>
<tr>
<td>120</td>
<td>-</td>
<td>-0.5°</td>
</tr>
</tbody>
</table>
PART 8 – RADAR OPERATION

RADAR CONTROLS

- Radar Antenna Elevation Dial
- Radar Memory (Minne) Mode Button
- Radar MKR Potentiometer (Amplification Gain) Dial
- Radar Fix Trigger
  - T0: Neutral
  - T1: First trigger detent
  - TV: Second trigger detent
- Radar Scan Range Selector
- Radar Terrain Avoidance Selector
- Radar Mode Selector
  - A0: Radar OFF
  - A1: Radar ON, Wide Search Mode with Sector PPI
  - A2: Radar ON, Narrow Search Mode with B-Scope
- Anti-Jamming (AS) Filter Mode Selector
All of these switches are explained in more details in the Flight Manual. At the moment the only controls that really matter to you should be:

- A0/A1/A2 Radar Mode Selector
- Radar Fix Trigger T0/T1/TV
- Radarstick Up/Down/Left/Right
- Radar Range Increase/Decrease
- Radar Antenna Elevation Up/Down
- Radar Terrain Avoidance Selector (sets radar antenna elevation at 0 deg relative to the horizon, which gives you radar returns at your altitude only)

The other controls are interesting, but not essential for standard DCS missions.
The radar has two display modes: PPI (Plan Position Indicator) and B-Scope.

- PPI is typically used on the Su-27 and shows a polar view of the radar.
- B-Scope is typically used on US fighters like the F-15 and shows a 2-D top down representation of a X-Y axis grid space.

These modes are controlled by the A0, A1 and A2 positions on the radar mode switch.

PPL (Wide Search) and B-Scope (Narrow Search) both have advantages in certain situations. As an example, if you are looking for ships you may prefer to scan a wider area. If you are looking for a specific coastline shape for a precision strike, the narrow mode will give you a clearer, more refined picture of what is directly in front of you. Pick the radar mode that suits you best.
As you can see, the two display modes represent the same things, but slightly differently. You can use pretty much any mode you want; the goal of the radar is to give you a picture of the landscape in front of you like mountains or rivers. The radar is especially useful when navigating a coastline.

The radar screen is a top-down view of what is being scanned by the radar. A radar return (in darker green) means that one of your radar beams bounced back to you because it was reflected by... you guessed it... Ground. The combination of all these radar returns gives you a sort of “map”. Think of the ground mapping radar as a sonar on a ship scanning the bottom of the ocean, but in front of you.
## THE WEAPONS

### MISSILES

<table>
<thead>
<tr>
<th>WEAPON</th>
<th>TYPE</th>
<th>RANGE</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-04E</td>
<td>Radar-guided anti-ship missile</td>
<td>24 km</td>
<td>Seeker Range: 8 km</td>
</tr>
<tr>
<td>RB-15F</td>
<td>Radar-guided anti-ship missile</td>
<td>70 km</td>
<td>More advanced functionalities than RB-04E</td>
</tr>
<tr>
<td>RB-05A</td>
<td>Radio-controlled air-to-air/air-to-ground missile</td>
<td>9+ km</td>
<td>Controlled with the RB-05 control unit</td>
</tr>
<tr>
<td>RB-75</td>
<td>TV-guided air-to-ground missile</td>
<td>22 km</td>
<td>Swedish version of the AGM65A “Maverick” Air-To-Ground Missile, uses the EP-13 collimated sight</td>
</tr>
<tr>
<td>RB-24J</td>
<td>Infrared-Guided Air-To-Air missile</td>
<td>-</td>
<td>Swedish version of the AIM-9P Sidewinder</td>
</tr>
<tr>
<td>RB-74</td>
<td>Infrared-Guided Air-To-Air missile</td>
<td>-</td>
<td>Swedish version of the AIM-9L Sidewinder</td>
</tr>
</tbody>
</table>

### BOMBS

<table>
<thead>
<tr>
<th>WEAPON</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/71</td>
<td>125 kg unguided bomb (available in low-drag and high-drag configurations)</td>
</tr>
<tr>
<td>BK-90 MJOLNIR</td>
<td>605 kg cluster munitions (guided missile)</td>
</tr>
</tbody>
</table>

### GUNS

<table>
<thead>
<tr>
<th>WEAPON</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKAN 30/55</td>
<td>30 mm gun pod with 150 rounds</td>
</tr>
</tbody>
</table>

### ROCKETS

<table>
<thead>
<tr>
<th>WEAPON</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARAK M/70B</td>
<td>6 x 135 mm unguided rockets per pod</td>
</tr>
</tbody>
</table>

**Note:** Keep in mind that the Viggen was designed to only use one type of air-to-ground ordnance at once. The reason is that when the Ground Crew loads the weapon, there is an external armament panel where they set the correct positions depending on the loadout of the aircraft (telling the aircraft what it is carrying). However, the two exceptions to that rule are a combination of the AKAN 30/55 gun with the RB-75 missile and a combination of the AKAN 30/55 gun with the RB-05 missile. If you take an invalid loadout of non-compatible weapons, you won’t be able to fire anything.
WEAPON TUTORIAL STRUCTURE

1. Mission Planning
2. RB-04E Anti-Ship Missile
3. RB-15F Anti-Ship Missile
4. RB-05A Radio-Controlled Missile
5. RB-75 TV-guided Air-to-Ground Missile
6. M/71 Bomb (High-Drag) – CCIP Delivery
7. M/71 Bomb (Low-Drag)
   1. Level Delivery
   2. Precision Dive Mode (DYK) Delivery
   3. Radar Delivery (With Ground Radar)
   4. Nav Delivery (On Navigation Waypoint)
8. BK-90 MJOLNIR Cluster Munitions
9. AKAN 30/55 Gun
10. ARAK M/70B Rockets
    1. Short Range Release
    2. Long Range Release
11. RB-24J Air-to-Air Missile
12. External Fuel Tank & Stores Jettison
TUTORIAL 1 – Mission Planning

Operating the Viggen has to be done in a very specific way if you intend to survive your combat operations. The Viggen is meant to fly low, fast, strike hard, and run back home as fast as possible. This means flying at 30 m from the ground most of the time. Why? Because there are two ways to avoid enemy air defenses: by either flying super high and hoping that the bazillion radars and missiles locked on you can’t reach you (which is quite unlikely) or by flying low and using terrain to mask your approach. The Viggen is explicitly designed to take the much smarter “ass-to-grass” approach.

There is a picture of a typical flight plan for a ground strike. You will navigate through various waypoints flying as low as humanly possible until you get to the Target Point (which is where... err... where the target is). However, you can’t just blindly fire rockets 10 m from the ground... for that, you need to “pop up” at the very last minute in order to spot your target, get a firing solution, bring the hurt and scram back to base.

In other words, we need to take a normal waypoint, transform it into a Target Point, and then from this Target Point create a Pop-Up point that will use this target point as a reference. Not that complicated now, eh? The Viggen requires more preparation than most aircraft in DCS, but if you spend that extra 5 min on the ground to set up your route properly, it can make your life much easier once you’re in the air dodging SAM sites left and right.

Not all missions types require a pop-up point, but in practice setting one up will help you immensely.
TUTORIAL 2 – RB-04E Anti-Ship Missile

1. PREPARATION: Gather and set target parameters
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT
   e) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Switch the Data Selector back to AKT POS - OUTPUT.

2. PREPARATION: Weapons Setup
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE for dual missile launch or to IMPULSE for single missile launch.
   c) Set Radar Targeting Mode to desired position: GRUPP for group or ENKEL for single targets.

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Set radar in Mode A1. You should see the Target Point close to the ships (identified as black spots), but not quite aligned. We will now align the Target Point on a specific ship using a Radar Fix.
   e) Hit T1, move crosshair over target using the radar controls, then hit TV to lock the radar on the target.
   f) Set flight path vector on target and fly within the allowed release altitude envelope (between 50 m and 425 m).
   g) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   h) Fire by pressing and holding the Weapon Release button when you are within launch range.
   i) Evade and pull up with 5 G.
   j) Set the trigger to SAFE by clicking on the stick’s safety cover.
   k) Set Master mode to NAV.
TUTORIAL 2 – RB-04E Anti-Ship Missile

2. PREPARATION: Weapons Setup
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE for dual missile launch or to IMPULSE for single missile launch.
   c) Set Radar Targeting Mode to desired position: GRUPP for group or ENKEL for single targets.

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   h) Fire by pressing and holding the Weapon Release button when you are within launch range.
   i) Evade and pull up with 5 G.
   j) Set the trigger to SAFE by clicking on the stick’s safety cover.
   k) Set Master mode to NAV.
TUTORIAL 2 – RB-04E Anti-Ship Missile

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
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   g) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   h) Fire by pressing and holding the Weapon Release button when you are within launch range.
   i) Evade and pull up with 5 G.
   j) Set the trigger to SAFE by clicking on the stick’s safety cover.
   k) Set Master mode to NAV.
TUTORIAL 2 – RB-04E Anti-Ship Missile

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
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   f) Set flight path vector on target and fly within the allowed release altitude envelope (between 50 m and 425 m).
   g) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   h) Fire by pressing and holding the Weapon Release button when you are within launch range.
   i) Evade and pull up with 5 G.
   j) Set the trigger to SAFE by clicking on the stick’s safety cover.
   k) Set Master mode to NAV.
TUTORIAL 3 – RB-15F Anti-Ship Missile (INTRODUCTION)

The RB-15F Anti-Ship missile is one of the most advanced weapons in DCS. Why? Because it is a missile that can be programmed to do pretty much whatever you want it to do. The concept of the RB-15 is that you should be able to fire (and forget) the missile from as far as possible, and then the missile will follow a set of specific mark points (Bx6, Bx7, Bx8, Bx9) until it reaches the target (boom). These mark points can be preset in the mission editor (which makes your life easier), or they can be set manually one by one, or they can be automatically generated using a certain method that we will see in this tutorial. The Mark Points Bx are reserved for this missile; here is what their functions are.

• Bx6: Descent Point. This is where the missile will start its descent towards mark point Bx7 (Course Change Point).
• Bx7: Course Change Point. This is where the missile will turn towards the target.
• Bx8: Assumed Target position (ATP). This is where the evil Russian opfor naval target is expected to be, and where the missile will strike.
• Bx9: Missile auto-destruction point. If a ship is docked in a port or near civilians, the missile can be programmed to self-destruct in case it misses the target. Since we are not scumbags, this point should be placed before the missile goes crashing straight into an orphanage.

xxJohnnx Tutorial for RB-15F (Basic): https://www.youtube.com/watch?v=rmb6V5yDcGw
xxJohnnx Tutorial for RB-15F (Advanced): https://www.youtube.com/watch?v=Te2y1V-hU5A
TUTORIAL 3 – RB-15F Anti-Ship Missile

1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT
   e) Press “9” and “B3” (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE for dual missile launch or to IMPULSE for single missile launch.
   c) Set Targeting Mode Selector to VALB (pilot inputted data) (or STD if you want a preset profile).
   d) Set Data Selector to TAKT – INPUT
   e) Press “800002” on the Data Selector keypad to set the missile preset to “Multiple Targets Medium Search Area”, and then press the LS/SKU button.
   f) Switch the Data Selector back to AKT POS - OUTPUT.
TUTORIAL 3 – RB-15F Anti-Ship Missile

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE for dual missile launch or to IMPULSE for single missile launch.
   c) Set Targeting Mode Selector to VALB (pilot inputted data) (or STD if you want a preset profile).
   d) Set Data Selector to TAKT – INPUT
   e) Press “B00002” on the Data Selector keypad to set the missile preset to “Multiple Targets Medium Search Area”, and then press the LS/SKU button.
   f) Switch the Data Selector back to AKT POS - OUTPUT.

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set radar in Mode A1. You should see the Target Point close to the ships (identified as black spots), but not quite aligned. We will now create a Mark Point on the target in order to tell the missile where to strike.
   c) Set up Mark Point Bx8 (ATP, or Assumed Target Position) by pressing the “Bx” button and pressing “8” on the keypad.
   d) Hit T1, move crosshair over target using the “Radarstick Up/Down/Left/Right” controls mapped to your stick, then hit TV to set the Assumed Target Position Bx8 on the target ship. Mark Points Bx6 and Bx7 should be automatically created.
   e) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   f) Set Weapon selector to ATTACK.
   g) The Bx6 (Descent Point) and Bx7 (Course Change Point) mark points will be marked on the radar with crosses. You can change their location using steps 3.c) and 3.d) individually.
   h) Set flight path vector on target and fly within the allowed release altitude envelope (between 50 m and 2000 m).
   i) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   j) Fire by pressing and holding the Weapon Release button when you are within launch range.
   k) Evade and pull up with 5 G.
   l) Set the trigger to SAFE by clicking on the stick’s safety cover.
   m) Set Master mode to NAV.
TUTORIAL 3 – RB-15F Anti-Ship Missile

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set radar in Mode A1. You should see the Target Point close to the ships (identified as black spots), but not quite aligned. We will now create a Mark Point on the target in order to tell the missile where to strike.
   c) Set up Mark Point Bx8 (ATP, or Assumed Target Position) by pressing the “Bx” button and pressing “8” on the keypad.
   d) Hit T1, move crosshair over target using the “Radarstick Up/Down/Left/Right” controls mapped to your stick, then hit TV to set the Assumed Target Position Bx8 on the target ship. Mark Points Bx6 and Bx7 should be automatically created.
   e) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   f) Set Weapon selector to ATTACK.
   g) The Bx6 (Descent Point) and Bx7 (Course Change Point) mark points will be marked on the radar with crosses. You can change their location using steps 3.c) and 3.d) individually.
   h) Set flight path vector on target and fly within the allowed release altitude envelope (between 50 m and 2000 m).
   i) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   j) Fire by pressing and holding the Weapon Release button when you are within launch range.
   k) Evade and pull up with 5 G.
   l) Set the trigger to SAFE by clicking on the stick’s safety cover.
   m) Set Master mode to NAV.
TUTORIAL 3 – RB-15F Anti-Ship Missile

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set radar in Mode A1. You should see the Target Point close to the ships (identified as black spots), but not quite aligned. We will now create a Mark Point on the target in order to tell the missile where to strike.
   c) Set up Mark Point Bx8 (ATP, or Assumed Target Position) by pressing the "Bx" button and pressing "8" on the keypad.
   d) Hit T1, move crosshair over target using the "Radarstick Up/Down/Left/Right" controls mapped to your stick, then hit TV to set the Assumed Target Position Bx8 on the target ship. Mark Points Bx6 and Bx7 should be automatically created.
   e) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   f) The Bx7 (Course Change Point) mark point will be marked on the radar with a cross. You can change its location using steps 3.c) and 3.d).
   g) Set flight path vector on target and fly within the allowed release altitude envelope (between 50 m and 2000 m).
   h) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   i) Fire by pressing and holding the Weapon Release button when you are within launch range.
   j) Evade and pull up with 5 G.
   k) Set the trigger to SAFE by clicking on the stick’s safety cover.
   l) Set Master mode to NAV.
TUTORIAL 3 – RB-15F Anti-Ship Missile

Ship (Bx8)
ATP: Assumed Target Position

Bx7
Course Change Point

Bx6
Descent Point

Missile

PART 9 – OFFENCE
WEAPONS & ARMAMENT
1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Set Data Selector to TAKT – INPUT
   c) Press “9” and “B3” (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   d) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to RB 05 MARK for ground targets or RB 05 SJÖ for naval targets or RB 05 LUFT for air targets.

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   c) Fly towards the target in a slight dive and place the flight path vector above it.
   d) Once you are about 10 km from target, set the trigger to UNSAFE by clicking on the stick’s safety cover. Once trigger is set to UNSAFE, the missile’s battery is activated and it has to be fired within 40 seconds or the missile will be unusable.
   e) Fire by pressing the Weapon Release button when ready and steer the missile using the “RB 05 Stick Pitch Up/Pitch Down/Yaw Left/Yaw Right” controls. You have to look at the smoke trail to gauge its trajectory visually.
   f) Set the trigger to SAFE by clicking on the stick’s safety cover.
   g) Set Master mode to NAV.

xxJohnxx Tutorial for RB-05E: [https://www.youtube.com/watch?v=7UuvXd1c18o](https://www.youtube.com/watch?v=7UuvXd1c18o)
1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Set Data Selector to TAKT – INPUT
   c) Press “9” and “B3” (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   d) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to RB 05 MARK for ground targets or RB 05 SJÖ for naval targets or RB 05 LUFT for air targets.

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   c) Fly towards the target in a slight dive and place the flight path vector above it.
   d) Once you are about 10 km from target, set the trigger to UNSAFE by clicking on the stick’s safety cover. Once trigger is set to UNSAFE, the missile’s battery is activated and it has to be fired within 40 seconds or the missile will be unusable.
   e) Fire by pressing the Weapon Release button when ready and steer the missile using the “RB 05 Stick Pitch Up/Pitch Down/Yaw Left/Yaw Right” controls. You have to look at the smoke trail to gauge its trajectory visually.
   f) Set the trigger to SAFE by clicking on the stick’s safety cover.
   g) Set Master mode to NAV.

**TUTORIAL 4 – RB-05E Radio-Controlled Missile**

- **Target**
- **Remote-Controlled Missile**
- **Flight Path Vector slightly above target**
- **10 km from target**
- **Trigger UNSAFE**
TUTORIAL 5 – RB-75 Air-to-Ground Missile

1. PREPARATION: Gather and set target parameters
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, ",[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   e) Switch the Data Selector back to AKT POS - OUTPUT.

2. PREPARATION: Weapons Setup
   a) Set Weapon selector to RB75.

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   c) The approximate target location will be showed on the HUD by a circle.
   d) Facultative: set autopilot to ATTITUDE HOLD and ALTITUDE HOLD to facilitate target spotting within the collimated sight.
   e) Hit T1, look into the EP-13 collimated sight and move crosshair over target using the "Radarstick Up/Down/Left/Right" controls mapped to your stick, then hit TV to lock the radar on the target.
   f) When you are about 15 km to target, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Fire by pressing and holding the Weapon Release button when you are within launch range.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
TUTORIAL 5 – RB-75 Air-to-Ground Missile

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   c) The approximate target location will be showed on the HUD by a circle.
   d) Facultative: set autopilot to ATTITUDE HOLD and ALTITUDE HOLD to facilitate target spotting within the collimated sight.
   e) Hit T1, look into the EP-13 collimated sight and move crosshair over target using the "Radarstick Up/Down/Left/Right" controls mapped to your stick, then hit TV to lock the radar on the target.
   f) When you are about 15 km to target, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Fire by pressing and holding the Weapon Release button when you are within launch range.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.

Targets: Cars on the runway (yes, use your imagination)

Slewable Sight Reticle with Radarstick controls
1) Press T0 to unlock the sight
2) Use Radarstick controls to slew reticle
3) Press TV to lock target

Radar Fix Trigger
T0: Neutral
T1: First trigger detent
TV: Second trigger detent

Attitude Hold will help you stay more stable when moving TV reticle

Target will be around here

20 km from target
3. **EXECUTION: Perform Attack**

   a) Set Master Mode to NAV and fly to Waypoint B2.
   b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   c) The approximate target location will be showed on the HUD by a circle.
   d) Facultative: set autopilot to ATTITUDE HOLD and ALTITUDE HOLD to facilitate target spotting within the collimated sight.
   e) Hit T1, look into the EP-13 collimated sight and move crosshair over target using the "Radarstick Up/Down/Left/Right" controls mapped to your stick, then hit TV to lock the radar on the target.
   f) When you are about 15 km to target, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Fire by pressing and holding the Weapon Release button when you are within launch range.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT.
   e) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3.
   f) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to BOMB PLAN.
   b) Set Impact Interval selector to 10 meters.
   c) Set the HUD to the LOWER position to ensure HUD data is properly displayed during bombing run.

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2.
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, reduce altitude to 100-150 m above ground level (AGL) and accelerate between Mach 0.8 and 0.9.
   d) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) Set target between the dot (first bomb drop point) and the circle (last bomb drop point) on the HUD and drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   f) Evade and pull up with 5 G.
   g) Set the trigger to SAFE by clicking on the stick’s safety cover.
   h) Set Master mode to NAV.

**Bunyap Tutorial for CCIP:** [https://www.youtube.com/watch?v=id4-v6HAiV08&](https://www.youtube.com/watch?v=id4-v6HAiV08&)**
3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2.
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, reduce altitude to 100-150 m above ground level (AGL) and accelerate between Mach 0.8 and 0.9.
   d) Weapon Arming Time Line appears when you are 40 seconds away from target. When it shrinks down within the Target Launch Zone, set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) Set target between the dot (first bomb drop point) and the circle (last bomb drop point) on the HUD and drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   f) Evade and pull up with 5 G.
   g) Set the trigger to SAFE by clicking on the stick’s safety cover.
   h) Set Master mode to NAV.
TUTORIAL 6 – M/71 Bomb (High Drag) – CCIP Delivery

Mode NAV. Drag chutes attached.

Trigger UNSAFE. Distance line indicates arming time. Numbers indicate the minimum time of fall for armed bombs.

Warning: Fragment zone

Distance line hidden.
Time of fall of bombs > maximum calculated time of fall (16 seconds)

Warning: First bomb time of fall < arming time (5.2 s)

Trigger pulled and held. Numbers placed on the right.

Mode NAV. Destination change automatic.
TUTORIAL 7 – M/71 Bomb (Low Drag)

Level Bombing Profile

Precision Dive Bombing (DYK) Profile

Navigation Bombing Profile

Radar Bombing Profile
1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT
   e) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Create Pop-Up Point U3 by setting its location in relationship to the Target point M3. We have to set up a desired heading and distance (km) to (not from) the target point M3. In this example, we will attack the target following a heading of 300 deg (from the target’s 4 o’clock). Press “300” for a heading to target of 300, followed by “070” for 7.0 km (300070) on the keypad. Then, press “B3” to create this new Pop-Up Point U3.
   g) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to BOMB PLAN.
   b) Set Impact Interval selector to 10 meters.
   c) Set the HUD to the LOWER position to ensure HUD data is properly displayed during bombing run.
2. **PREPARATION: Weapons Setup**
   
a) Set Weapon selector to BOMB PLAN.
   b) Set Impact Interval selector to 10 meters.
   c) Set the HUD to the LOWER position to ensure HUD data is properly displayed during bombing run.

3. **EXECUTION: Perform Attack**
   
a) Set Master Mode to NAV and fly to Waypoint B2.
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to U3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target at an altitude of 200 m.
   f) Align target indication ring with HUD reticle (dot), then set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) When release cue (horizontal line = drop bombs in 2 seconds) is displayed, wait for the HUD to slip down and then drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
TUTORIAL 7.1 – M/71 Bomb (Low Drag) – Level Delivery

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to U3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target at an altitude of 200 m.
   f) Align target indication ring with HUD reticle (dot), then set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) When release cue (horizontal line = drop bombs in 2 seconds) is displayed, wait for the HUD to slip down and then drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.

**Note:**
The reticule may disappear below the HUD if the aircraft is in a slight climb, or slightly high. In that case, the pilot will have to estimate the release point.
Mode NAV

Mode NAV: Target indicator ring on target position

Trigger UN SAFE: Target indicator ring disappears. Radar ranging used.

Firing warning: Distance flashing 2 seconds before latest release point.

Release signal: Wings appear 0.5 s before latest release point.

Trigger pulled and held. Numbers placed on the right. Ring is the steering order.

When the last release impulse is sent from the computer: Steering order flashes and store released (FULLD LAST) lit. Trigger can be released. Bombs will be released within the release parameters are met.

Pilot flies according to the steering order so that commanded altitude is maintained.

Steering order when the last bomb impact has been passed.

Trigger SAFE: Target indicator ring appears.

Mode NAV: Destination change automatic.
TUTORIAL 7.2 – M/71 Bomb (Low Drag) – Precision Dive Mode (DYK) Delivery

1. PREPARATION: Gather and set target parameters
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard (“RSHIFT+K” to open, “[” and “[” to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT
   e) Press “9” and “B3” (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Create Pop-Up Point U3 by setting its location in relationship to the Target point M3. We have to set up a desired heading and distance (km) to (not from) the target point M3. In this example, we will attack the target following a heading of 300 deg (from the target’s 4 o’clock). Press “300” for a heading to target of 300, followed by “070” for 7.0 km (300070) on the keypad. Then, press “B3” to create this new Pop-Up Point U3.
   g) Switch the Data Selector back to AKT POS - OUTPUT.

2. PREPARATION: Weapons Setup
   a) Set Weapon selector to BOMB DYK.
   b) Set Impact Interval selector to 10 meters.
   c) Set the HUD to the LOWER position to ensure HUD data is properly displayed during bombing run.
3. **EXECUTION: Perform Attack**

   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target.
   f) Align target indication ring with target, and set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Stay aligned on target indication ring and when firing cue is flashing, drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   h) Evade and pull up with 4 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target.
   f) Align target indication ring with HUD reticle (dot), and once you are stable and aligned set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Stay aligned on target indication ring and when firing cue is flashing, drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   h) Evade and pull up with 4 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
TUTORIAL 7.2 – M/71 Bomb (Low Drag) – Precision Dive Mode (DYK) Delivery

- Mode NAV
- Ranging via triangulation. Sight line relative to horizon
- 2.5° Radar ranging is used if parameters are met (this will appear)
- Trigger UNSAFE. Target indicator ring disappears
- Target motion measurement used. Doppler wind frozen

0.5 seconds before the latest firing range the firing signal is displayed (twinkling)

Trigger pulled and held. Numbers placed on the sight
The ring is the steering order
The pilot should as quickly as possible make sure that the reticule follows the steering order. Computer will release bombs on the designated target when the trigger was pulled.

Point has not followed the steering order properly. 3° pales flash. Take evasive action.

When the bomb hits, the sight has been released the steering order disappear, and the store release (GASLED LAST) light is lit. Trigger can be released.

Mode NAV. Destination change automatic. Can also be done manually in mode ANE.
TUTORIAL 7.3 – M/71 Bomb (Low Drag) – Radar Delivery

1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT - INPUT.
   e) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Radar Mode selector to Mode A0 (Radar OFF).
   b) Set Weapon selector to BOMB RR.
   c) Set Impact Interval selector to 15 meters.

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2.
   b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   c) Set Radar Mode selector to A1 or A2.
   d) On Radar Screen, steer aircraft to align the cross with target area market with a circle, and set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) Fly to the altitude required using your HUD as a reference.
   f) When radar return or target point circle passes the firing range line, drop bombs by pressing and holding continuously the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   g) Evade and pull up with 5 G.
   h) Set the trigger to SAFE by clicking on the stick’s safety cover.
   i) Set Master mode to NAV.

Bunyap Tutorial for Radar Bombing: https://www.youtube.com/watch?v=1Sx5M3EB8s&
TUTORIAL 7.3 – M/71 Bomb (Low Drag) – Radar Delivery

3. **EXECUTION: Perform Attack**
   
a) Set Master Mode to NAV and fly to Waypoint B2
   
b) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   
c) Set Radar Mode selector to A1 or A2.
   
d) On Radar Screen, steer aircraft to align the cross with target area marked with a circle, and set the trigger to UNSAFE by clicking on the stick’s safety cover.
   
e) Fly to the altitude required using your HUD as a reference.
   
f) When radar return or target point circle passes the firing range line, drop bombs by pressing and holding **continuously** the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   
g) Evade and pull up with 5 G.
   
h) Set the trigger to SAFE by clicking on the stick’s safety cover.
   
i) Set Master mode to NAV.
TUTORIAL 7.3 – M/71 Bomb (Low Drag) – Radar Delivery

Mode NAV.

Mode ANE Commanded altitude = Safety altitude.
Trigger UNSAFE.

Trigger pulled and held when the target radar return passes the firing range line at 3 km. Altitude numbers placed on the right. Distance line starts to shrink.

2 seconds before bombs are released the distance line flashes. Trigger is still held.
Bombs release in 0.5 seconds. Distance line fully extended. Trigger still pulled but released when the stores released (FALLD LAST) is lit, which indicates that the last bomb has been released.

Trigger released.

Mode NAV and trigger SAFE.

As you can see, radar strikes with dumb bombs are not very precise. They are mostly aimed at strikes with poor weather conditions or large coastal targets like an island.
TUTORIAL 7.4 – M/71 Bomb (Low Drag) – Nav Delivery

1. PREPARATION: Gather and set target parameters
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard (“RSHIFT+K” to open, “[“ and “]” to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Note: We do not need to set the Navigation Waypoint as a Target Waypoint: our target will be the Navigation Waypoint directly.

2. PREPARATION: Weapons Setup
   a) Set Radar Mode selector to Mode A0 (Radar OFF).
   b) Set Weapon selector to BOMB RR.
   c) Set Impact Interval selector to 10 meters.

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Once you cross Waypoint 2 and the HUD switches from B2 to B3.
   c) On HUD, steer aircraft to align the circle with the dot and fly to reference altitude
   d) Once the range line appears and flashes, drop bombs by pressing and holding the Trigger UNSAFE, then the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   e) Evade and pull up with 5 G.
   f) Set the trigger to SAFE by clicking on the stick’s safety cover.

Bunyap Tutorial for Nav Bombing: https://www.youtube.com/watch?v=1SSx5M3EB8s&
TUTORIAL 7.4 – M/71 Bomb (Low Drag) – Nav Delivery

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Once you cross Waypoint 2 and the HUD switches from B2 to B3.
   c) On HUD, steer aircraft to align the circle with the dot and fly to reference altitude
   d) Once the range line appears and flashes, drop bombs by pressing and holding the Trigger UNSAFE, then the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   e) Evade and pull up with 5 G.
   f) Set the trigger to SAFE by clicking on the stick’s safety cover.

---

**3c** Keep target circle and reticle (dot) aligned

**3a** Fly to reference altitude

**3d** Trigger UNSAFE

**3d** Line shows you have dropped your ordnance

**3d** Flashing indicator shows you are 2 seconds before being within firing range

**3d** HUD range line shows you are almost within range

**3c** Illuminates when all bombs are dropped
As you can see, nav strikes (just like radar strikes) with dumb bombs are not very precise. They are mostly aimed at strikes with poor weather conditions.
1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "+[ ] and [ ]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT.
   e) Press “9” and “B3” (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE for multiple bomb drops or to IMPULSE for single bomb drop.
   c) Set Targeting Mode Selector to VALB (pilot inputted data).
   d) Set Data Selector to TAKT – INPUT.
   e) Press “921000” on the Data Selector keypad to set the bomb area preset to “Long Area”, and then press the LS/SKU button.
   f) Switch the Data Selector back to AKT POS - OUTPUT.
   g) Set the HUD to the LOWER position to ensure HUD data is properly displayed during bombing run.

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Target Point M3 at Mach 0.7-0.9 at an altitude 100-500 m AGL; the HUD indications should be blinking (meaning that you are out of range for the moment). Set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) When HUD distance bar fits between the vertical bars, it indicates that you are in range (about 6 km from target). Drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   f) Evade and pull up with 5 G.
   g) Set the trigger to SAFE by clicking on the stick’s safety cover.
   h) Set Master mode to NAV.

---

**Bunyap Tutorial for BK-90 Cluster Munitions Bombing:**
https://www.youtube.com/watch?v=xWLA8Zadwyl
TUTORIAL 8 – BK-90 MJOLNIR Cluster Munitions

2. PREPARATION: Weapons Setup
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE for multiple bomb drops or to IMPULSE for single bomb drop.
   c) Set Targeting Mode Selector to VALB (pilot inputted data).
   d) Set Data Selector to TAKT – INPUT
   e) Press “921000” on the Data Selector keypad to set the bomb area preset to “Long Area”, and then press the LS/SKU button.
   f) Switch the Data Selector back to AKT POS - OUTPUT.
   g) Set the HUD to the LOWER position to ensure HUD data is properly displayed during bombing run.

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Target Point M3 at Mach 0.7-0.9 at an altitude 100-500 m AGL; the HUD indications should be blinking (meaning that you are out of range for the moment). Set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) When HUD distance bar fits between the vertical bars, it indicates that you are in range (about 6 km from target). Drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   f) Evade and pull up with 5 G.
   g) Set the trigger to SAFE by clicking on the stick’s safety cover.
   h) Set Master mode to NAV.
TUTORIAL 8 – BK-90 MJOLNIR Cluster Munitions

3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Target Point M3 at Mach 0.7-0.9 at an altitude 100-500 m AGL; the HUD indications should be blinking (meaning that you are out of range for the moment). Set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) When HUD distance bar fits between the vertical bars, it indicates that you are in range (about 6 km from target). Drop bombs by pressing and holding the Weapon Release button until the FALLD LAST (STORES RELEASED) light illuminates.
   f) Evade and pull up with 5 G.
   g) Set the trigger to SAFE by clicking on the stick’s safety cover.
   h) Set Master mode to NAV.
TUTORIAL 9 – AKAN 30/55 GUN

1. **PREPARATION: Gather and set target parameters**
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+k" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT.
   e) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3.
   f) Create Pop-Up Point U3 by setting its location in relationship to the Target point M3. We have to set up a desired heading and distance (km) to (not from) the target point M3. In this example, we will attack the target following a heading of 300 deg (from the target's 4 o’clock). Press “300” for a heading to target of 300, followed by "070" for 7.0 km (300070) on the keypad. Then, press “B3” to create this new Pop-Up Point U3.
   g) Switch the Data Selector back to AKT POS - OUTPUT.

2. **PREPARATION: Weapons Setup**
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE.
3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target.
   f) Set reticle on target, and when reticle is on the target and stable set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Fire by pressing the Weapon Release button when the range indicator is flashing.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
3. **EXECUTION: Perform Attack**
   
   a) Set Master Mode to NAV and fly to Waypoint B2
   
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target.
   
   f) Set reticle on target, and when reticle is on the target and stable set the trigger to UNSAFE by clicking on the stick’s safety cover.
   
   g) Fire by pressing the Weapon Release button when the range indicator is flashing.
   
   h) Evade and pull up with 5 G.
   
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   
   j) Set Master mode to NAV.
Figure 183 Rockets and gun pod attack profile.

1. Pop-up
2. Master mode ANP*
3. Triangulation
4. Trigger UNSAFE
5. Radar ranging begins**
6. Earliest firing distance
7. Latest firing distance
8. Pull-up
 Tutorial 10.1 – ARAK M/70B ROCKETS – Short Range Release

1. Preparation: Gather and set target parameters
   a) We start our attack run from Waypoint B2 and intend to attack our target, which is located on Waypoint B3.
   b) Read QFE of Target from Kneeboard ("RSHIFT+K" to open, "[" and "]" to scroll pages), which is located on Waypoint B3.
   c) Set altimeter pressure to the QFE of the Target.
   d) Set Data Selector to TAKT – INPUT
   e) Press "9" and "B3" (desired waypoint on the target’s position) to set Navigation Waypoint B3 as a Target Point M3
   f) Create Pop-Up Point U3 by setting its location in relationship to the Target point M3. We have to set up a desired heading and distance (km) to (not from) the target point M3. In this example, we will attack the target following a heading of 300 deg (from the target’s 4 o’clock). Press “300” for a heading to target of 300, followed by “070” for 7.0 km (300070) on the keypad. Then, press “B3” to create this new Pop-Up Point U3.
   g) Switch the Data Selector back to AKT POS - OUTPUT.

2. Preparation: Weapons Setup
   a) Set Weapon selector to ATTACK.
   b) Set Release mode switch to SERIE/IMPULSE to SERIE.

---

Heatblur Tutorial for ARAK Rockets: [https://www.youtube.com/watch?v=YMZH4FLC5vA](https://www.youtube.com/watch?v=YMZH4FLC5vA)
TUTORIAL 10.1 – ARAK M/70B ROCKETS – Short Range Release

3. EXECUTION: Perform Attack
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target.
   f) Set reticle on target, and when reticle is on the target and stable set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Fire by pressing the Weapon Release button when the range indicator is flashing.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
3. **EXECUTION: Perform Attack**
   a) Set Master Mode to NAV and fly to Waypoint B2
   b) Set HUD mode to “Low Altitude” by setting the SLAV SI switch to FRAN (OFF).
   c) Once you cross Waypoint 2 and the HUD switches from B2 to M3, set Master mode to ANF.
   d) Fly to Pop-Up Point by following the HUD indications. Keep in mind that you will be following on the HUD the Pop-Up Point (which is a Target Point translated).
   e) Once you reach the Pop-Up Point (Waypoint Indicator will switch from U3 to M3), immediately pull up and roll towards target.
   f) Set reticle on target, and when reticle is on the target and stable set the trigger to UNSAFE by clicking on the stick’s safety cover.
   g) Fire by pressing the Weapon Release button when the range indicator is flashing.
   h) Evade and pull up with 5 G.
   i) Set the trigger to SAFE by clicking on the stick’s safety cover.
   j) Set Master mode to NAV.
TUTORIAL 10.1 – ARAK M/70B ROCKETS – Short Range Release

Figure 183 Rockets and gun pod attack profile

1. Pop-up
2. Master mode ANF
3. Triangulation
4. Trigger UNSAFE
5. Radar ranging begins
6. Earliest firing distance
7. Latest firing distance
8. Pull-up
Note: The LONG RANGE RELEASE of ARAK rockets is done exactly the same way as in the SHORT RANGE RELEASE method, apart from the Weapons Setup Preparation. The only thing that differs is that we disable the Target Motion Measurement system and the Radar Ranging.

2. **PREPARATION: Weapons Setup**
   
a) Set Weapon selector to ATTACK.
b) Set Release mode switch to SERIE/IMPULSE to IMPULSE.
c) Disable Target Motion Measurement by setting the Data Selector to TAKT – INPUT, entering “221” on the keypad and pressing the “LS/SKU” button.
d) Disable Radar Ranging by setting the Data Selector to TAKT – INPUT, entering “253” on the keypad and pressing the “LS/SKU” button.
e) Switch the Data Selector back to AKT POS - OUTPUT.
TUTORIAL 11 – RB-24J Air-to-Air Missile

1. PREPARATION: Weapons Setup
   a) Set Weapon selector to IR-RB (or press “IR Missile Fast Select” button binding).
   b) Set target wingspan on the selector (not that important when you are doing this visually).

2. EXECUTION: Perform Attack
   a) Set Master mode to ANF.
   b) Aim the Flight Path Vector at the target visually
   c) Confirm sidewinder growling tone.
   d) Set the trigger to UNSAFE by clicking on the stick’s safety cover.
   e) Fire missile by pressing and holding the Weapon Release button for 2 seconds when the seeker growl pitch goes higher.
   f) Set the trigger to SAFE by clicking on the stick’s safety cover.
   g) Set Master mode to NAV.

Bunyap Tutorial for RB-24J “Sidewinder” missile:
https://www.youtube.com/watch?v=xWLA8ZadwyI&feature=youtu.be&t=18m7s
TUTORIAL 12 – External Fuel Tank & Stores Jettison

1. **TO JETTISON THE EXTERNAL TANK:**
   a) Flip cover switch of the X-TANK button.
   b) Press the X-TANK button.

2. **TO JETTISON EXTERNAL STORES:**
   a) Flip cover switch of the NODF button.
   b) Press the NODF button.
Countermeasures are very simple to use in the Viggen. You have three countermeasure types at your disposal: flares, chaff and an ECM (Electronic Countermeasure) jammer. We will explore together what is used against what, and how.

Missiles can generally track you using 2 things: radar signature (radar waves are sent on you and you reflect them, which is called a “radar signature”) and heat signature (like the exhaust of your engines). Countermeasures will only be effective against the kind of weapon it was meant to counter; a heat-seeking missile will not care if you deploy electronic countermeasures against it since it tracks heat, not radar signatures. This is why it is important to know what is attacking you in order to counter it properly. This is what the RWR (Radar Warning Receiver) is for: to help you know what is firing at you so you can take the adequate action to counter it.

- **Flares** are used against missiles that track heat (infrared or IR) signatures. Instead of going for the heat signature generated by your engines, a missile will go for a hotter heat source like flares.
- **Chaff** is a form of “passive” jamming. Passive (reflected) jamming is when a deceptive object or device reflects radar waves. Chaff is simply a bundle of small pieces of metal foil with reflective coating, which creates clusters of radar signatures that prevent a radar to get a solid lock on the aircraft itself.

The Viggen is equipped with countermeasure systems that are contained in two pods: the **KB countermeasure pod**, which contains chaff and flares, and the U22 (old) or **U22/A (modernized) ECM pod** that will act as a radar jammer.

Keep in mind that you need to equip these pods if you want to use them and that they cannot be jettisoned. Placing them under your wings will take valuable space and prevent you from carrying additional armament: use your judgement on what you need and what you don't need. The outcome remains the same though: if you forget to equip these pods, your only way to defend yourself will be to dive at treetop level and dodge those SAM sites and missiles.
To deploy chaff and flare:

1) Set desired countermeasure program mode
   - Manual modes will drop chaff or flares or both based on your program
   - Automatic mode will drop chaff only if a radar has locked you

2) Press the Fast Countermeasure Dispense for quick release OR the Countermeasure (KB) Dispense Switch to INT or KONT.
# COUNTERMEASURES – FLARES & CHAFF PROGRAMS

<table>
<thead>
<tr>
<th>Program</th>
<th>What does it do?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1: Chaff Rapid Release</strong></td>
<td>Releases chaff and flares rapidly for 1.5 min.</td>
</tr>
<tr>
<td>Set KB Mode Selector – 1</td>
<td></td>
</tr>
<tr>
<td>Set Streak Selector – 0</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure Selector – R+F</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure KB switch – FRAN (OFF)</td>
<td></td>
</tr>
<tr>
<td><strong>P2: Chaff Rapid Release (default quick release)</strong></td>
<td>Releases chaff and flares at 2 second intervals and 2.5 second pauses for 3.5 min. Interval repeated as long as KB release switch is held.</td>
</tr>
<tr>
<td>Set KB Mode Selector – 2</td>
<td></td>
</tr>
<tr>
<td>Set Streak Selector – 0</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure Selector – R+F</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure KB switch – INT or KONT</td>
<td></td>
</tr>
<tr>
<td><strong>P3: Slow Release</strong></td>
<td>Releases chaff and flares at a fifth of the speed of program P1 – Chaff Rapid Release for 8 min (8 min if two pods are equipped since the two pods will release in parallel, not in series as in program P4)</td>
</tr>
<tr>
<td>Set KB Mode Selector – 3</td>
<td></td>
</tr>
<tr>
<td>Set Streak Selector – 0</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure Selector – R+F</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure KB switch – INT or KONT</td>
<td></td>
</tr>
<tr>
<td><strong>P4: Slow Streak Release</strong></td>
<td>Releases chaff and flares at a fifth of the speed of program P1 – Chaff Rapid Release for 8 min (16 min if two pods are equipped since the pods release in series, not in parallel as in program P3)</td>
</tr>
<tr>
<td>Set KB Mode Selector – 4</td>
<td></td>
</tr>
<tr>
<td>Set Streak Selector – 4</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure Selector – R+F</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure KB switch – INT or KONT</td>
<td></td>
</tr>
<tr>
<td><strong>Quick Release</strong></td>
<td>Uses Program P2 – Chaff Rapid Release when pressing the Quick Release button on the throttle</td>
</tr>
<tr>
<td><strong>Automatic</strong></td>
<td>Releases chaff automatically using Program P2 – Chaff Rapid Release when the RWR detects a radar lock in targeting mode.</td>
</tr>
<tr>
<td>Set KB Mode Selector – A</td>
<td></td>
</tr>
<tr>
<td>Set Streak Selector – 0</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure Selector – R+F</td>
<td></td>
</tr>
<tr>
<td>Set Countermeasure KB switch – INT or KONT</td>
<td></td>
</tr>
</tbody>
</table>

**Countermeasures Mode Selector (KB)**
- A: Automatic
  - 0: Off
  - 1: Mode 1
  - 2: Mode 2
  - 3: Mode 3

**Countermeasure (KB) Dispense Switch**
- OFF / INT / KONT

**Countermeasure Streak Mode Selector**
- 0: Mode 0
- 4: Mode 4

**Countermeasure Selector**
- R: Chaff (Remsor)
- RF: Chaff and Flares
- F: Flares (Facklor)
RWR (RADAR WARNING RECEIVER)

The RWR (Radar Warning Receiver) works very simply: radar locks are identified on the Course Indicator in a top-down view. Simply set the mode using the LIUS or LJUS/LJUD to set the warning method (by sound and visual marker or by visual marker only).

Radar Warning Receiver (RWR) Mode Selector
FRÅN = OFF
LIUS: Visual Warning Only
LIUS/LJUD: Visual and Audio Warning
**RWR (RADAR WARNING RECEIVER) – WHAT’S THAT SOUND?**

Have you ever wondered what kind of sound corresponded to what? Well, wonder no more! There is a very cool tool at [http://www.viggentools.se/](http://www.viggentools.se/) that allows you to generate RWR sounds and listen to the bleeps and bloops of the Viggen’s noisy RWR.

---

### RWR tone generator

- **Volume**
- **Highlight PRF Freq.**

#### Airborne
- **Stop** AJ37 Viggen
- **Play**
  - E-2D
  - E-3A
  - A-50
  - MIG-21bis - Emitter 1
  - MIG-21bis - Emitter 2
  - MIG-21bis - Emitter 3
  - MIG-266 - Emitter 1
  - MIG-266 - Emitter 2
  - MIG-266 - Emitter 3
  - Su-27 - Emitter 1
  - Su 27 - Emitter 2
  - Su 27 - Emitter 3
  - F-15C - Emitter 1
  - F-15C - Emitter 2
  - F-15C - Emitter 3
  - Mirage-2000C - Emitter 1
  - Mirage-2000C - Emitter 2
  - Mirage-2000C - Emitter 3

#### Ground
- **Play**
  - Kub - SA-6 - Search
  - Kub - SA-6 - Tracking
  - Buk - SA-11 - Search A
  - Buk - SA-11 - Search B
  - Buk - SA-11 - Tracking
  - S-120 - SA-3 - Emitter 1
  - S-120 - SA-3 - Emitter 2
  - S-120 - SA-19 - Search
  - Tunguska - SA-19 - Search
  - Tor - SA-15 - Emitter 1
  - Tor - SA-15 - Emitter 2
  - S-300PS - SA-10 - SR S300M
  - S-300PS - SA-10 - SR S300E
  - S-300PS - SA-10 - Tracking
  - Osu - SA-3 - Tracking
  - ZSU-24-4 Stuka - Tracking
  - Hawk - SR AN/MPQ-55
  - Hawk - SR AN/MPQ-50
  - Hawk - Search
  - Hawk - Tracking
  - Roland - EWR
  - Roland - Search
  - Roland - TR ADS
  - Vulcan - Tracking
  - Gepard - Tracking
  - Patriot - Search
  - Patriot - Tracking
  - EWR

#### Naval
- **Play**
  - FFL 1144.4 Grisha - Search
  - FFL 1144.4 Grisha - Tracking
  - CV Admiral Kuznetsov - Search
  - CV Admiral Kuznetsov - Tracking
  - FFS Admiral Kuznetsov - Search
  - FFS Admiral Kuznetsov - Tracking
  - CG 1154 Moskva - Search
  - CG 1154 Moskva - Tracking
  - FFG 11540 Neustrashimy - Search
  - FFG 11540 Neustrashimy - Tracking
  - CGN 1144.2 Pyotr Velikiy - Search
  - CGN 1144.2 Pyotr Velikiy - Tracking
  - FF 1155M Rezky - Search
  - FF 1155M Rezky - Tracking
  - CG-60 Normandy - Search
  - CG-60 Normandy - Tracking
  - FFG-7CCL Oliver Hazard Perry - Search
  - FFG-7CCL Oliver Hazard Perry - Tracking
  - CVN-70 Carl Vinson - Search
  - CVN-70 Carl Vinson - Tracking
**ECM Jammer (U22/A Pod)**

The ECM (Electronic Countermeasure) jammer can be used by combining the two selectors. The jammer has the following functions:

- **OFF Mode**: Pod is disabled
- **Preheat Mode**: Pod is being preheated and prepared for use.
- **Silent Recording Mode**: Pod will receive and record incoming signals and will not emit any jamming signals.
- **Active Emission Mode**: Pod will emit jamming signals and attempt to drown scanning radar emitters with white noise.
- **For more details, consult the actual manual.**

---

**Table: ECM Jammer Modes**

<table>
<thead>
<tr>
<th>Resulting mode</th>
<th>U22 mode selector mode</th>
<th>U22 bandwidth selector mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>0</td>
<td>No function</td>
</tr>
<tr>
<td>Preheat</td>
<td>A</td>
<td>F</td>
</tr>
<tr>
<td>Silent recording</td>
<td>A</td>
<td>G H J K</td>
</tr>
<tr>
<td>Active emission</td>
<td>B</td>
<td>F G H J K</td>
</tr>
<tr>
<td>Active emission</td>
<td>D</td>
<td>F G H J K</td>
</tr>
<tr>
<td>Active emission</td>
<td>E</td>
<td>F G H J K</td>
</tr>
</tbody>
</table>
You have two radios available: the FR 22 V/UHF radio and a FR 24 VHF AM backup radio.

**V/UHF FR 22 radio** is used for communications between 103 and 155.975 MHz (VHF) and communications between 225.00 and 399.95 MHz (UHF). It can use both custom and preset channels as well (preset channels can be changed in the mission editor). Preset channel frequencies should be available in mission briefing.

**VHF AM FR 24 radio** is used for fixed preset channels (E, F and G), which includes an emergency guard channel (121.5 MHz). communications between 225.00 and 399.95 MHz (UHF). It can only use preset channels (preset channels can be changed in the mission editor). Preset channel frequencies should be available in mission briefing.

The functionalities of both FR 22 and FR 24 radios are done through the FR24 mode selector.

- NORM: FR 22 main radio
- H: Guard Frequency (121.5 MHz)
- E, F, G: FR 24 backup radio, presets emergency channels

You can transmit using the “FR22 Push-to-Talk” and “FR24 Push-to-Talk” key bindings.

**NOTE:** More detailed tutorials will come as the developer’s manual is completed.
The FR22 may seem complicated at first, but it’s not that difficult once you know what different buttons are used for.

- RED: Special Preset Channels. Used for special communication channels (i.e. JTAC).
- BLUE: Base Preset Channels. Used to communicate with the ATC (Air Traffic Controllers). Button A/G typically selects a channel in the VHF range while the C/F typically selects a channel in the UHF range.
- YELLOW: Group Preset Channels. Used to communicate with other flights (i.e. AWACS, allied fighters, etc).

FR22 V/UHF Radio

SPECIAL CHANNELS (Preset)
- **H**: Guard Frequency (121.5 MHz)
- **1**: Special Channel 1, used for wingman.
- **2**: Special Channel 2, used for wingman.
- **Blank** (should be a 3): Special Channel 3, used for wingman.
- **-**: Manually Dialed Frequency

BASE CHANNELS (Preset)
- **ROTARY**: Used to select a preset Airbase
- **A/G**: Used to select sub-channel A for a selected airbase (rotary).
- **B**: Used to select sub-channel B for a selected airbase (rotary).
- **C/F**: Used to select sub-channel C for a selected airbase (rotary).
- **C2**: Used to select sub-channel C2 for a selected airbase (rotary).
- **D/E**: Used to select sub-channel D for a selected airbase (rotary).

Example: Selecting Rotary 1 and pressing A/G button will select Channel A of Airbase Anapa-Vityazevo, which is 121MHz.

GROUP CHANNELS (Preset)
- **ROTARY**: Used to select a preset group
- **1**: Sub-Group Channel 1...
- **2**: Sub-Group Channel 2...

Example: Selecting Rotary 1 and pressing the 1 button will select the first group, first aircraft, which is the AWACS (E-3A). Selecting Rotary 2 and pressing the 1 button will select the second group, first aircraft, which is an F-15C.
AIRFIELD FREQUENCIES (BASE PRESETS)

You can find airfield ATC frequencies by opening the kneeboard (RSHIFT+K) and by cycling through pages using [ and ].

### RADIO FREQUENCIES – AIRFIELDS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anapa</td>
<td>121.0</td>
</tr>
<tr>
<td>Batumi</td>
<td>131.0</td>
</tr>
<tr>
<td>Beslan</td>
<td>141.0</td>
</tr>
<tr>
<td>Gelendzhik</td>
<td>126.0</td>
</tr>
<tr>
<td>Gudauta</td>
<td>130.0</td>
</tr>
<tr>
<td>Kobuleti</td>
<td>133.0</td>
</tr>
<tr>
<td>Kutaisi</td>
<td>134.0</td>
</tr>
<tr>
<td>Krasnodar Center</td>
<td>122.0</td>
</tr>
<tr>
<td>Krasnodar Pashkovsky</td>
<td>128.0</td>
</tr>
<tr>
<td>Krymsk</td>
<td>124.0</td>
</tr>
<tr>
<td>Maykop</td>
<td>125.0</td>
</tr>
<tr>
<td>Mineral’nye Vody</td>
<td>135.0</td>
</tr>
<tr>
<td>Mozdok</td>
<td>137.0</td>
</tr>
<tr>
<td>Nalchik</td>
<td>136.0</td>
</tr>
<tr>
<td>Novorossiysk</td>
<td>123.0</td>
</tr>
<tr>
<td>Senaki</td>
<td>132.0</td>
</tr>
<tr>
<td>Sochi</td>
<td>127.0</td>
</tr>
<tr>
<td>Soganlug</td>
<td>139.0</td>
</tr>
<tr>
<td>Sukhumi</td>
<td>129.0</td>
</tr>
<tr>
<td>Tblisi</td>
<td>138.0</td>
</tr>
<tr>
<td>Vaziani</td>
<td>140.0</td>
</tr>
</tbody>
</table>
AUTOPILOT TUTORIAL

There are three autopilot modes. Click the lights to engage them.

- **SPAK**: Main dampening mode.
- **ATT**: Attitude hold. Maintains pitch angle when it is engaged and will maintain roll angle if > 7 deg and < 66 deg.
- **HÖJD**: Altitude hold.

Note: ATT mode is very useful when going on bombing runs that require a steady aim. HÖJD mode is useful when going on low-level sea strikes.
NAVIGATION INTRODUCTION

The Navigation systems and tools at your disposal are:

**TERNAV**: Terrain Navigation system that uses the radar altimeter to detect the terrain contours below the aircraft and complements the normal navigation system, providing minor automatic fixes as the nav systems accumulate drift positional error. It is initiated automatically on engine start-up.

**TILS**: The Tactical Instrument Landing System is a simpler, swedish-built version of an ILS (Instrument Landing System) that will assist you in finding the proper way to land on an airfield.

**CI** (Course Index): The Course Index and Course Ring allows you to know your current heading and find which course to take to fly to your selected waypoint.

**Ground Radar Display**: The radar display will help you locate the waypoint you want to navigate to. It will also show you the ground geography and topography with a top-down view of what is in front of you.

**ADI** (Attitude Director Indicator): Its yellow lines will tell you your current deviation in terms of altitude and heading in relationship with the waypoint you are flying to.

**HUD**: The HUD (Heads-Up Display) can give you a brief view of the general direction you need to fly to in order to align yourself with the selected waypoint.
NAVIGATION INTRODUCTION

Waypoint Types:

- LS: Starting Airfield Waypoint
- B1, B2, B3...: Navigation Waypoint
- BX1, BX2, BX3...: Mark Points (used for RB-15F anti-ship missile)
- M1, M2, M3...: Target Points (a customizable navigation waypoint used for ground strikes)
- U1, U2, U3...: Target Pop-Up Points (used in low-level rocket strikes)
- L1: Primary Landing Site
- L2: Secondary Landing Site

Selectors Buttons:

- LS/SKU: Selects the Takeoff Base or Tracked Target (reconnaissance)
- B1-B9: Selects a Normal Navigation Waypoint
- BX: Selects a BX point
- L/MAL: Selects Primary Landing Base L1 (first press) or Secondary Landing Base L2 (second press)

<table>
<thead>
<tr>
<th>Function</th>
<th>1st digit</th>
<th>2nd digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off base</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Primary landing base</td>
<td>L</td>
<td>1</td>
</tr>
<tr>
<td>Secondary landing base</td>
<td>L</td>
<td>2</td>
</tr>
<tr>
<td>Alternate / Reciprocal heading</td>
<td>L (Flashing)</td>
<td>1</td>
</tr>
<tr>
<td>primary landing base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternate / Reciprocal heading</td>
<td>L (Flashing)</td>
<td>2</td>
</tr>
<tr>
<td>secondary landing base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landing waypoint (TILS) Primary</td>
<td>LB</td>
<td>1</td>
</tr>
<tr>
<td>Landing waypoint (TILS) Primary</td>
<td>LB</td>
<td>2</td>
</tr>
<tr>
<td>Touchdown point Primary base</td>
<td>LF</td>
<td>1</td>
</tr>
<tr>
<td>Touchdown point Secondary base</td>
<td>LF</td>
<td>2</td>
</tr>
</tbody>
</table>

NAVIGATION

<table>
<thead>
<tr>
<th>Navigation waypoints</th>
<th>B</th>
<th>1-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target waypoint</td>
<td>M</td>
<td>1-9</td>
</tr>
<tr>
<td>Popup point</td>
<td>U (RED)</td>
<td>1-9</td>
</tr>
<tr>
<td>Visual fix in progress</td>
<td>E</td>
<td>1-9</td>
</tr>
<tr>
<td>Radar fix in progress</td>
<td>E (Flashing)</td>
<td>1-9</td>
</tr>
</tbody>
</table>

RECONNAISSANCE

<table>
<thead>
<tr>
<th>Corner and centre points</th>
<th>R</th>
<th>1-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured targets</td>
<td>M (RED)</td>
<td>1-9</td>
</tr>
<tr>
<td>Tracked targets</td>
<td>S (RED)</td>
<td>1-9</td>
</tr>
<tr>
<td>Mark points</td>
<td>BX</td>
<td>1-5</td>
</tr>
</tbody>
</table>

BX6-9 are used for RB 15 missile planning and cannot be used by the aircraft for navigation.
NAVIGATION INTRODUCTION

**Target Point vs Waypoint**

There is an important distinction between a Waypoint (B1, B2, B3...) and a Target Point (M1, M2, M3...). A waypoint is a fixed point to be used as a navigation reference, while the target point can be used to track targets and aim your weapons, which means that a target point can be modified manually without affecting the other waypoints. Offsetting a waypoint, on the other hand, would offset every other waypoint as well as a means to correct an accumulated drift error (which can be quite inconvenient if you don’t want to shift all your other waypoints too).

Generally speaking, you can take a normal waypoint (i.e. Waypoint B3) and change it into a target point (i.e. M3), and vice-versa.

**To change a waypoint B3 into a target point M3**
1. Set Data Selector to TAKT
2. Set Data Selector to INPUT mode
3. Press “9” on the keypad
4. Press the B3 button. Your selected waypoint indicator will change into “M3”.
5. Set Data Selector to OUTPUT mode
6. Set Data Selector to AKT POS (Active Position)

**To change a target point M3 into a waypoint B3**
1. Set Data Selector to TAKT
2. Set Data Selector to INPUT mode
3. Press “0” on the keypad
4. Press the B3 button. Your selected waypoint indicator will change into “B3”.
5. Set Data Selector to OUTPUT mode
6. Set Data Selector to AKT POS (Active Position)
NAVI GATI ON TUTORIAL

As a tutorial, we will do the following:

a) Add a Waypoint B4 and Takeoff from Senaki-Kolkhi
b) Fly to Waypoint B1 using the Course Index (CI)
c) Fly to Waypoint B2 using the HUD and ADI
d) Fly to Target Point M3 using the Radar Display
e) Offset the Target Point M3 and overfly its updated location
f) Fly to Waypoint B4 and perform an ILS landing at Primary Airfield L1 (Senaki-Kolkhi)
NAVIGATION TUTORIAL

A) Add a Waypoint B4 and Takeoff from Senaki-Kolkhi

1. It is always a good idea to press the “Reference Button” on the joystick to align the compass to the runway heading on takeoff.

2. We will add a navigation waypoint (B4) set to Sukhumi Airdrome. Using the F10 map, we can see that its coordinates are: 42°51’08” North, 41°08’35” East.

3. To add a waypoint (i.e. B4), set Data Selector to REF/LOLA in INPUT mode.

4. On keypad, enter coordinates in degrees, minutes and seconds for Longitude and Latitude. As an example, coordinates from the F10 map 42°51’08” North (Latitude), 41°08’35” East (Longitude) are entered as 410835425108 (East coord first, North coord second, which might seem counterintuitive if you use the F10 East-North coordinates.)

5. Press button B4 to save coordinates for new waypoint.

6. Set the Data Selector back to AKT-POS in OUTPUT mode and takeoff as shown in the TAKEOFF section.

Take note that if you want to add or overwrite a landing airfield waypoint, you can simply set Data Selector to REF/LOLA in INPUT mode, enter either “90” (code for primary landing airfield) or “99” (code for alternate landing airfield) followed by the code of the airfield you want to add, which is available in the keyboard on a list by pressing “RSHIFT+K” and cycling through it using “[“ and ”]”. Then, you would need to press the L MAL button. Adding Batumi as an alternate landing airfield would be 9911.
NAVIGATION TUTORIAL

B) Fly to Waypoint B1 using the Course Index

1. As you takeoff and leave the runway, you will notice that you will automatically switch from Waypoint LS (your starting point) to Waypoint B1.
2. Using the Course Ring, steer your aircraft towards Waypoint B1 by aligning the white triangle (current heading) with the yellow index on the Course Index (ring).
3. When you fly over waypoint B1, the navigation system will automatically switch to the next one (B2) saved in your mission data cartridge, which contains all waypoints stocked in the mission editor.
NAVIGATION TUTORIAL

C) Fly to Waypoint B2 using the HUD and ADI

1. As you overfly waypoint B1, waypoint B2 will automatically be selected.
2. You can use the HUD to track Waypoint B2 by aligning the Flight Path Vector between the Pole Tracks (as if you were “chasing” the tracks to fly through the middle of them, meaning that you are on course once the tracks are in a fixed location on the HUD).
3. Alternatively, you can also use the ADI Vertical Flight Director bar. Fly the aircraft to align the vertical bar with the center of the ADI as shown on the screenshot. Once the vertical bar is centered, you are on course with Waypoint B2.
NAVIGATION TUTORIAL

D) Fly to Target Point M3 using the Ground Radar Display

1. Once we have overflown waypoint B2, the nav system will automatically switch to the M3 Target Point. We can use the radar screen to locate the target point.
2. Ensure your Master Mode is set to NAV.
3. Turn on radar ON by setting it to either Mode A1 (PPI, or Plan-Position Indicator) or A2 (B-Scope) using the “A2 Mode (Three Position Switch)” control mapped on your stick.
4. Find Target Point displayed on the top-down view radar screen (it should be a circle). You can adjust the radar range using the “Radar Range 120/60/30/15 km” controls mapped on your stick.

Note: The Ground Radar will give you a bird’s eyeview display of the geography. Radar controls are explained more thoroughly in the Radar section of this guide.
NAVIGATION TUTORIAL

E) Offset the Target Point M3 and overfly its updated location

1. In order to change the M3 Target Point location, we will do it with the ground radar controls. We can see the M3 Target Point represented by a circle on the radar display.

2. Press the T1 Fix control. A cross will appear over the waypoint circle.

3. Move the cross using the “Radarstick Up/Down/Left/Right” controls mapped to your stick.

4. Once the cross is over the desired location of the modified Target Point, press the TV Fix control. The cross will disappear and the waypoint circle will move on the new target point’s location. You will notice that the Course Index’s location on the ring also changed when you changed the waypoint’s location.
NAVIGATION TUTORIAL

F) Fly to Waypoint B4 and perform an ILS landing at Primary Airfield L1 (Senaki-Kolkhi)

1. Instead of continuing towards our planned waypoint B4, select the Primary Landing Site waypoint at Senaki-Kolkhi by setting the Master Mode at NAV and the Data Selector to AKT-POS and pressing “L MAL” button. Head towards waypoint L1.
2. When you are less than 40 km from the waypoint, set Master Mode to LANDNING NAV. Waypoint designation will change to LB1.
3. Fly to an altitude of 500 m.
4. Set the TILS channel selector to A (Automatic) and ensure the TILS light is lit.
5. Follow the pole tracks on your hud. It will lead you towards the ILS approach.
6. Fly the aircraft in a way that the yellow flight director bars on the ADI are centered. This will give you a good heading (vertical bar) and a good glide slope (horizontal bar).
7. When you are 10 km from the airfield, deploy landing gear and arm thrust reverser system.
8. Set your flight path vector on the runway’s edge while maintaining the yellow flight directors on the ADI centered.
9. Maintain a MAXIMAL AoA (Angle of Attack) of 12 deg AoA and aircraft attitude by aligning the descent line on the runway threshold. This will give you a descent angle of 3 deg.
• Do not slow down under 260 km/h.
10. Gently Touchdown and land when crossing runway threshold.
NAVIGATION TUTORIAL

F) Fly to Waypoint B4 and perform an ILS landing at Primary Airfield L1 (Senaki-Kolkhi)

Align Flight Path Marker with center of pole tracks

Fly to keep the vertical and horizontal flight director bars centered

FOLLOW THE POLE TRACKS: THEY WILL LEAD YOU TO THE RUNWAY

Flight Path Vector in correct position

Runway

Currently at 50 km (5 Swedish miles) from LB1

LB1 Waypoint

Fly to keep the vertical and horizontal flight director bars centered

Currently at 7 km from LB1

APPROACH WITH GOOD GLIDE SLOPE, GOOD SPEED, GOOD ATTITUDE
ADDITIONAL NOTES ON NAVIGATION

TERNAV, or HOW YOUR DRIFT NAVIGATION ERRORS CORRECT THEMSELVES

You may or may not find this slide useful, but I thought I’d tell you about why TERNAV is awesome and how you can monitor your flight computer’s current precision status. The TERNAV is a fairly abstract system: you can’t quite see it visually, but this unsung hero of a system makes your life much easier by providing automatic small fixes as your navigation system accumulates positional drift errors.

For instance, if you set the Data Selector to AKT POS in OUTPUT mode, you will see 6 digits:
• The first four digits will alternate between the longitude (degrees and minutes) and the latitude (degrees and minutes) of the currently selected waypoint
• The fifth digit is the TERNAV status
• The sixth digit is the estimation of positional error (in km)

TERNAV Status Legend (5th Digit):
• 0: TERNAV inoperable
• 1: TERNAV OK, but not sending any output (standby mode).
• 2: TERNAV OK, mode rough search (attempting to orient itself).
• 3: TERNAV OK, mode fine search (higher resolution, still attempting to orient itself)
• 4: TERNAV OK and following, but not used.
• 5: TERNAV OK and operating, system sending automatic fixes to CK37 Flight Computer.
If you play in multiplayer and don’t feel like adding the waypoint coordinates every time, there is a way to create a new mission data cartridge with waypoints created by using the F10 map.

1. Make sure your aircraft’s data cartridge is removed
2. Press F10 to display the map, then select the MARK LABEL button
3. Click where you want to create a point, then type “B” followed by the waypoint number you want to create. “B1” would be “Navigation Waypoint 1”. For a target point, type “M” followed by the target point number you want to create. “M2” would be “Target Point 2”.
4. Display your kneeboard using the “RSHIFT+K” binding.
5. Cycle through pages using “[“ and “]” until you reach the GROUND CREW SETTINGS page.
6. Your current selected data cartridge is indicated.
7. Change data cartridge by using the “LCTRL+LALT+C” binding until you find the “Cartridge from marks on F10 map”.
8. Click on the data cartridge slot to load the new cartridge.
9. Start data cartridge loading procedure as shown in the start-up procedure.
F10 MAP WAYPOINTS – DATA CARTRIDGE IN MULTIPLAYER

LOADING UP FLIGHT PLAN

10. Load flight plan data from the mission cartridge by setting the Data Selector knob to REF/LOLA.
11. Set INPUT/OUTPUT data switch to INPUT.
12. Enter code 9099 (Fictional Airport No. 99).
13. Press the LS waypoint to start data transfer process. The data transfer will be in-progress when the first “9” digit is flashing, and the process will be complete once all digits revert back to “0”.
14. Once data transfer is complete, set INPUT/OUTPUT data switch to OUTPUT.

First “9” digit is flashing
DATA TRANSFER IN PROGRESS

All digits set to 0
DATA TRANSFER COMPLETE
ACRONYMS

- AFK: Automatisk Fart Kontroll (Autothrottle)
- APP-27: RWR (Radar Warning Receiver)
- CI: Central Indicator
- CK-37: Central Kalkylator 37, or Central Computer
- FLI-37: Attitude Director Indicator
- HAW: High Alpha (Angle of Attack) Warning
- HUD: Heads-Up Display
- KB: Countermeasures Pod
- PS-37/A: Ground Radar
- SA-06: Autopilot
- TERNAV: Terrain Navigation System, similar to TERCOM systems in cruise missiles.
- TILS: Tactical Instrument Landing System
- U-22: ECM (Electronic Countermeasures) Pod
RESOURCES

Viggen Tutorials by xxJohnxx
https://www.youtube.com/playlist?list=PLs4yzB9MM2Sw3okBvFavzBugu-1UpkEPr

Test Flight Series by Bunyap
https://www.youtube.com/playlist?list=PLoiMNU5jyFzTzeNVgj3fQpG1x8taECYLS