

# History of C2-systems in the SWEDISH AIR FORCE



SWEDISH ARMED FORCES  
HEADQUARTERS

## Select timeframe:



## Select category:

- C2 Systems
- Military Radar
- Hight Finders
- ATS Radar
- FV2000, Tactical loop
- TDL

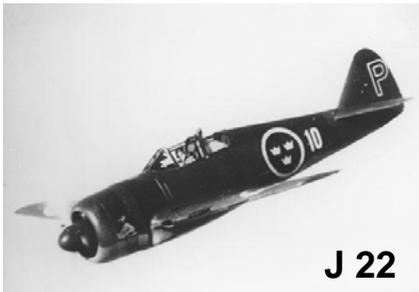




- 47    48 - 56    57 - 65    66 - 71    72 - 80    81 - 92    93 - 00    01 -



- 1947



- Human sensors
- Army Air Surveillance Site
- C2 Facilities
- "Stril 40"





## Human sensors

- 1947

- **Optical surveillance**
- **Reports to C2 by telephone**
- **Army-organisation**



SWEDISH ARMED FORCES  
HEADQUARTERS



## Army Air Surveillance Site

- 1947

- **Mainly paperbased C2**
- **One Air Force Officer with authority to scramble squadron**



SWEDISH ARMED FORCES  
HEADQUARTERS



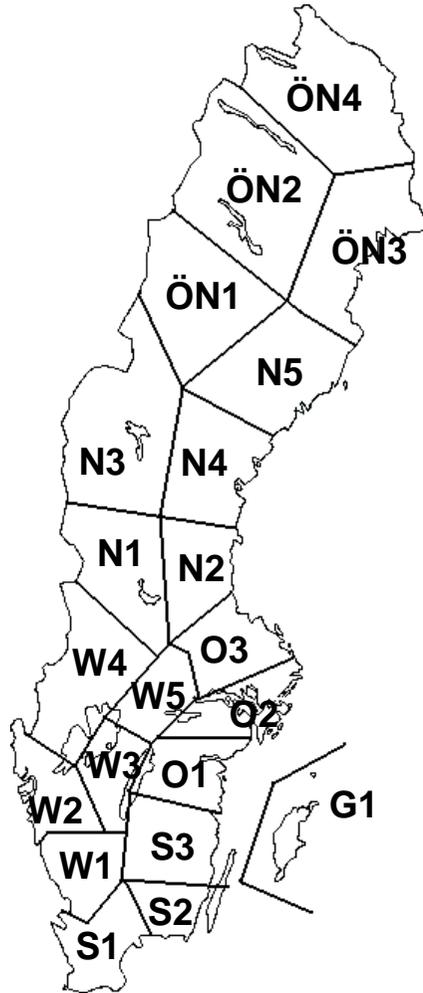
## C2 Facility

- 1947

- **SOC, Old type of Sector Operations Cell (Jaktcentral, jc)**
- **Human sensor using radio (Jakt-Is)**







## 1948 - 1956

- The triggering factor...
- Human sensors
- Radar sensors
- C2 Facilities
- "Stril 50"





## The triggering factor... 1948 1956

**June 13 1952**

**Swedish DC-3 was shot down over the Baltic Sea**

**Three days later Swedish SAR Catalina also was shot down**



**The triggering of Swedish Air Force QRA (Quick Readiness Alert)**





## Human Sensors 1948 1956

- **Optical surveillance (Ls)**  
(from 1948 organized by  
the Air Force)



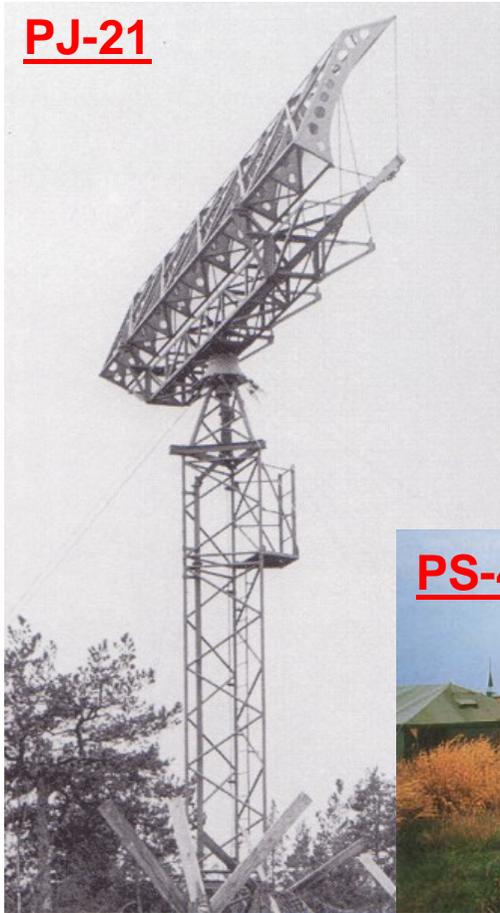
- **SOC, Sector Operations Centre**  
**Filtering site (Lgc)**





# Radar Sensors 1948 1956

PJ-21



PS-16



PH-13



PS-41



ER IIIb





## C2 Facilities 1948 1956

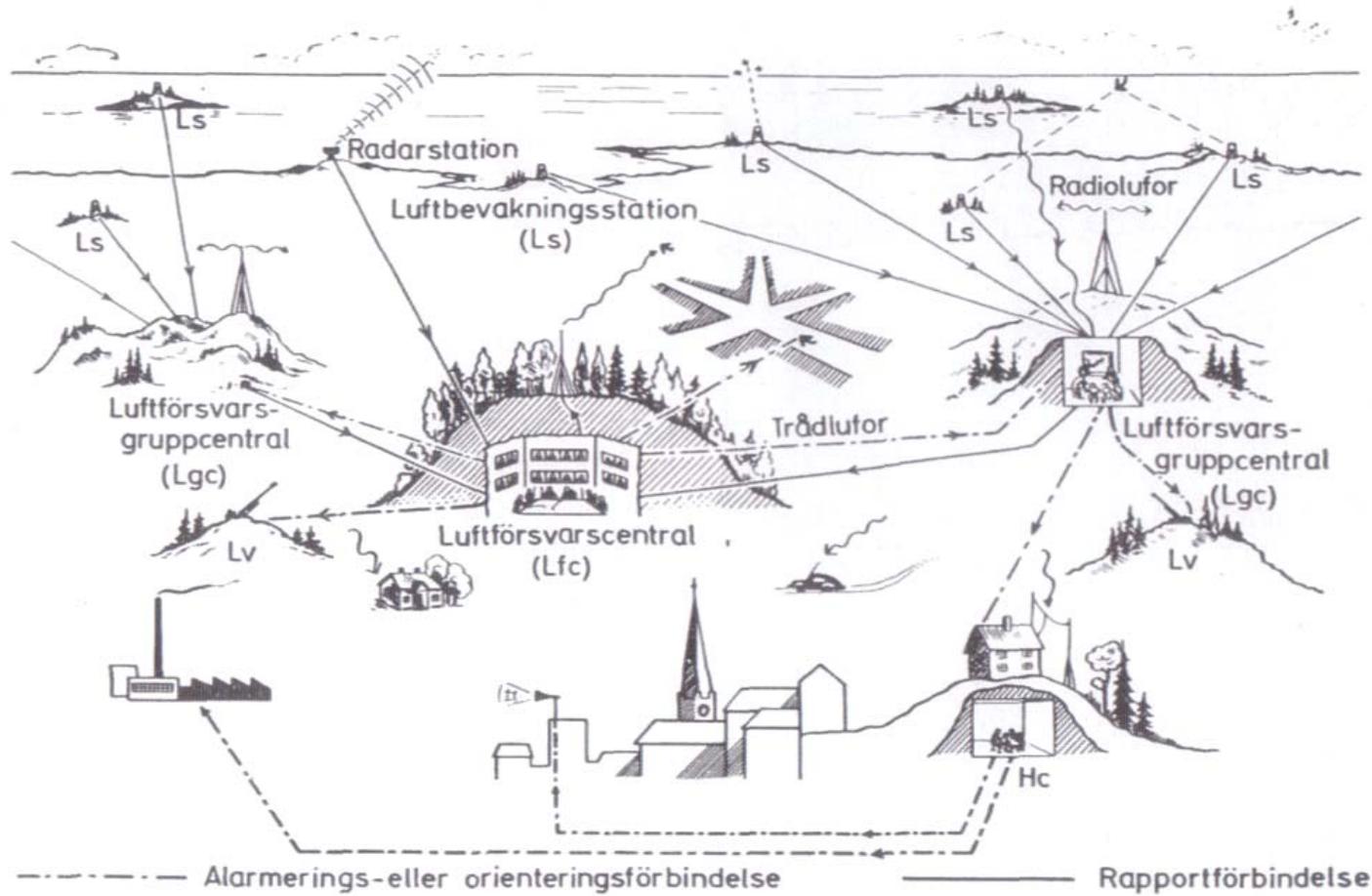


- AOC, Air Operations Centre  
(Lfc m/50)



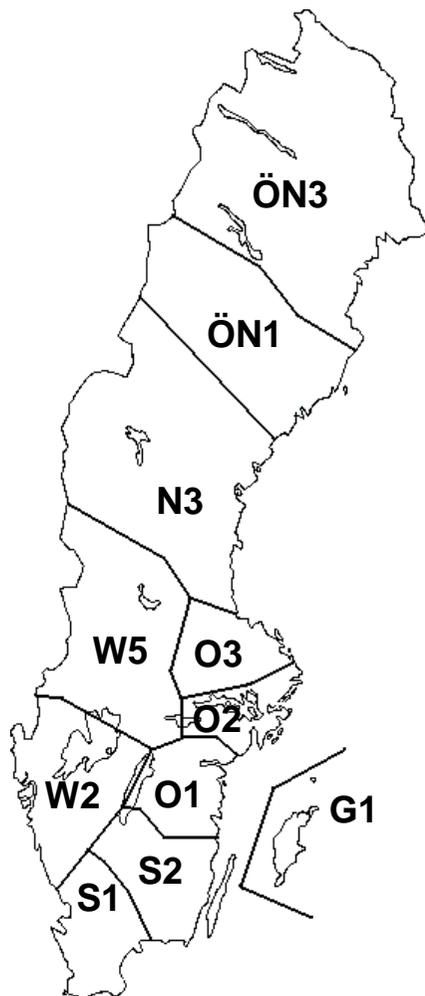


# "Stril 50" 1948 1956





# 1957 - 1965



- Radar sensors
- High Finders
- C2 Facilities
- G/A Data Link
- Stril 60

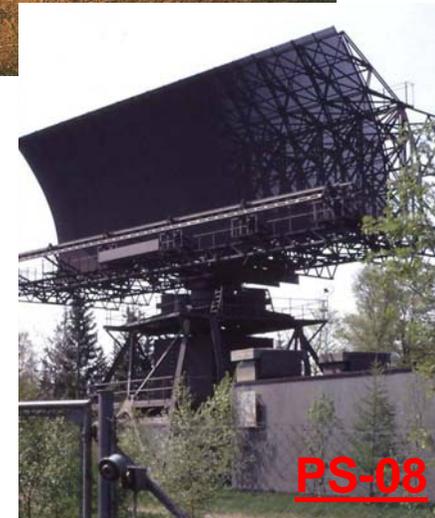


J 32





# Radar Sensors 1957 1965



**Hight Finders**



SWEDISH ARMED FORCES  
HEADQUARTERS



# Hight Finders 1957 1965



PH-13



PH-12

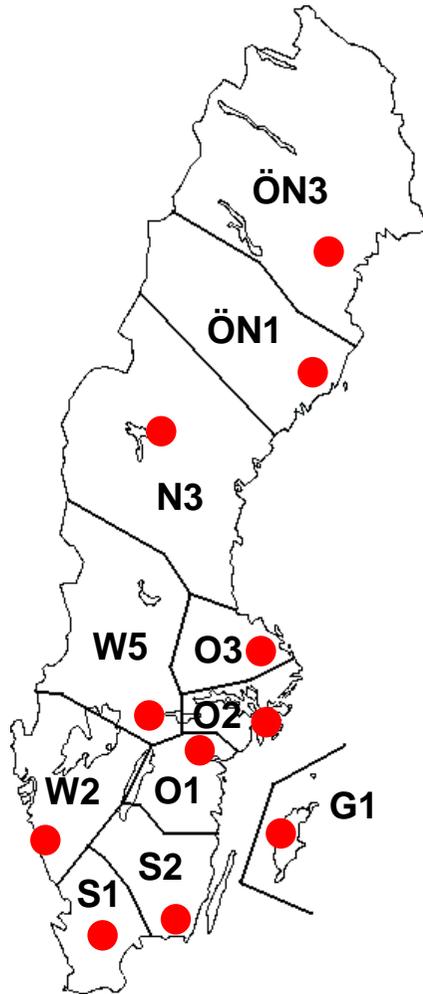


PH-40





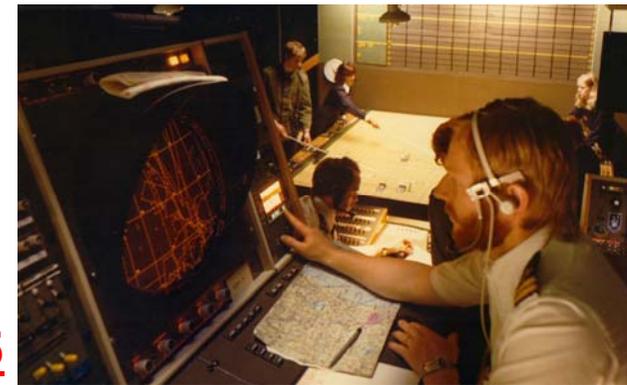
## C2 Facilities   1957 1965



● AOC  
(Lfc m/50)



C2-cell 08



C2-cell 65



SWEDISH ARMED FORCES  
HEADQUARTERS



## G/A Data Link 1957 1965

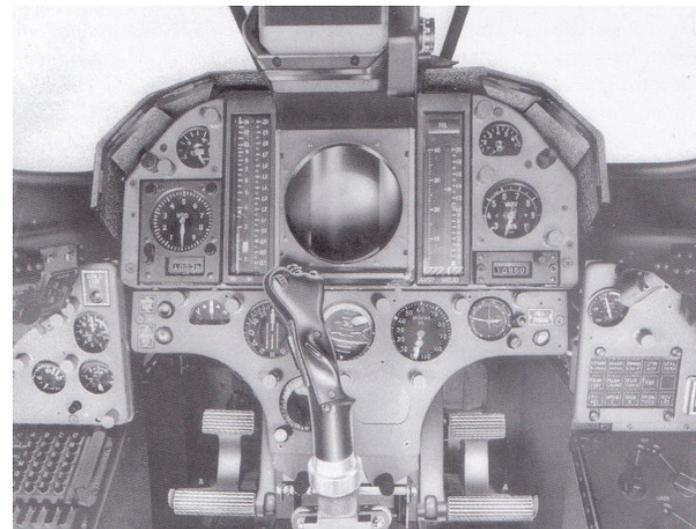
G/A data link introduced in Swedish Air Force early 60's



### C2-cell 08

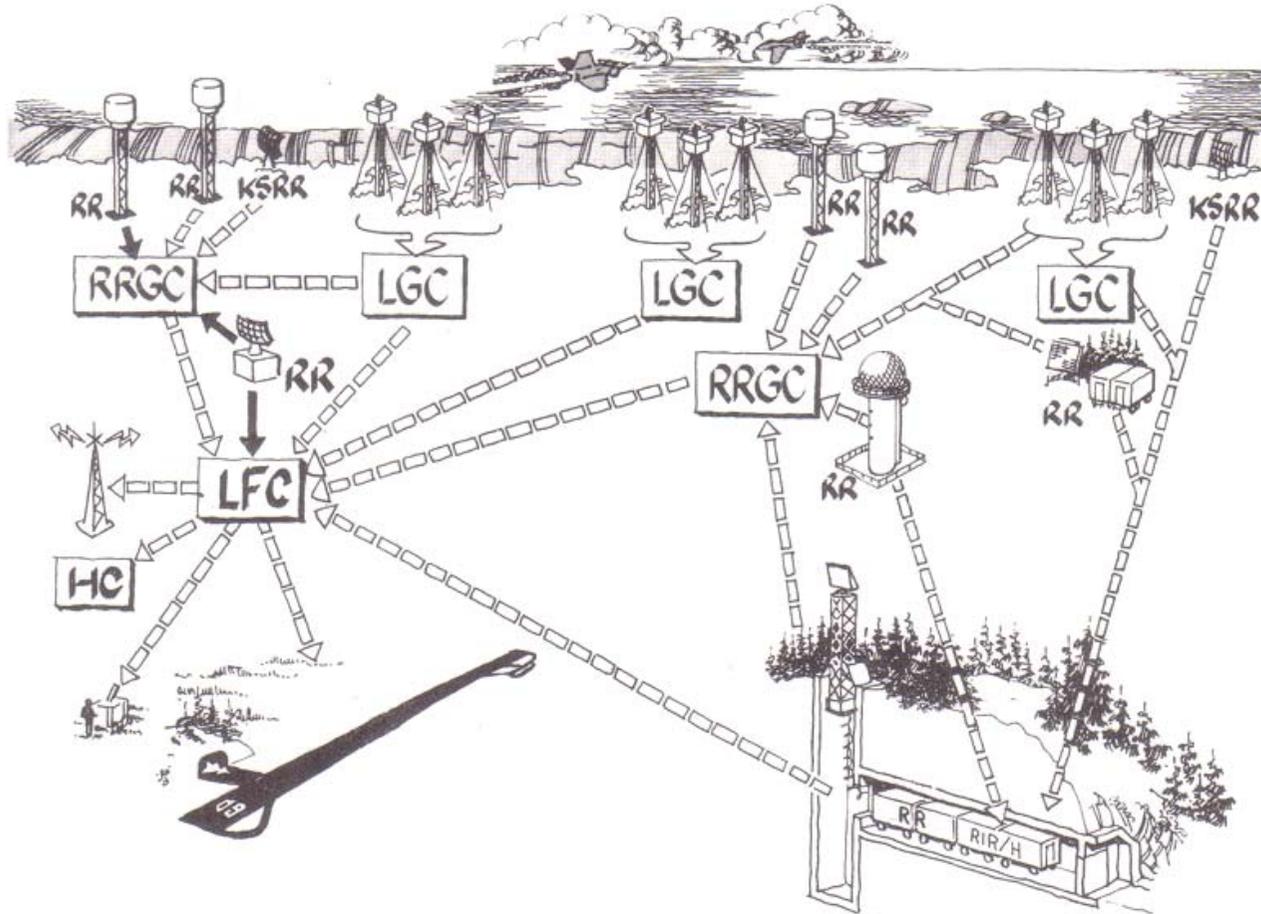


### J 35





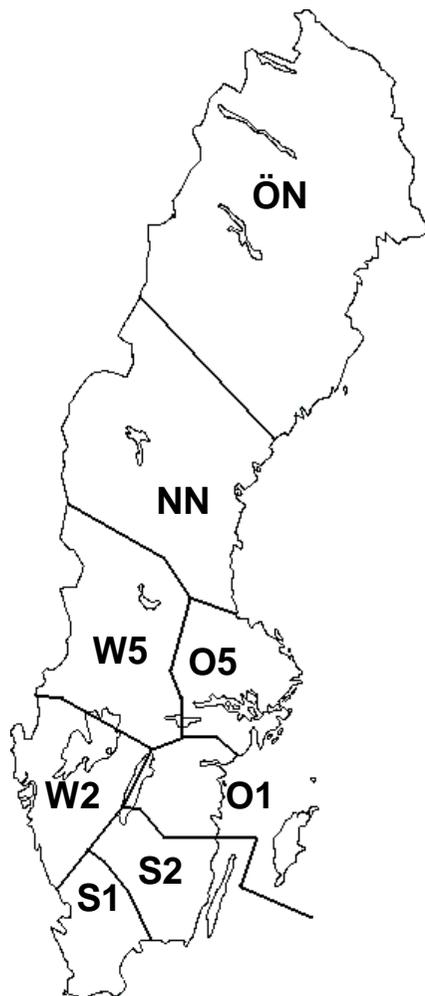
Stril 60  1957 1965



SWEDISH ARMED FORCES  
HEADQUARTERS



## 1966 - 1971



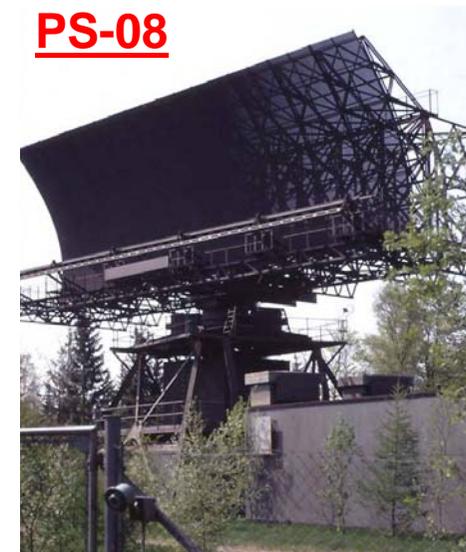
- Radar sensors
- Hight Finders
- C2 Facilities
- Rb 68, Bloodhound





# Radar Sensors 1966 1971

## Hight Finders





# Hight Finders 1966 1971



**PH-13**



**PH-39**



**PH-12**

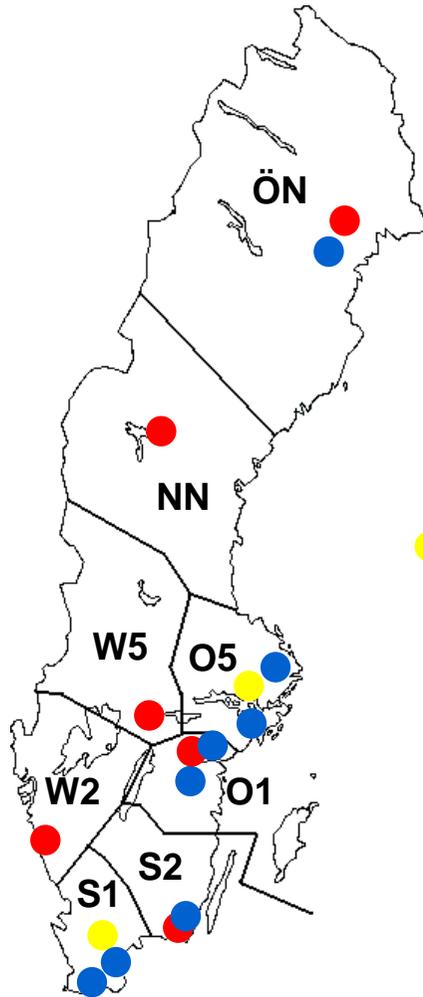


**PH-40**





# C2 Facilities 1966 1971



● AOC (Lfc 1)

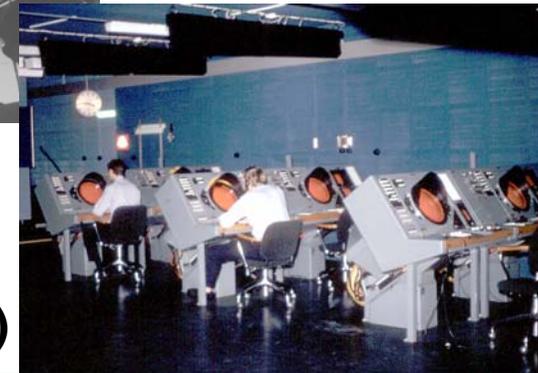


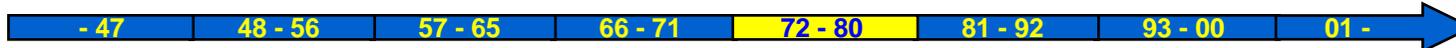
J 35



● AOC (Lfc m/50)

● SOC (Rrgc/F)





## 1972 - 1980



- Radar sensors
- Hight Finders
- C2 Facilities

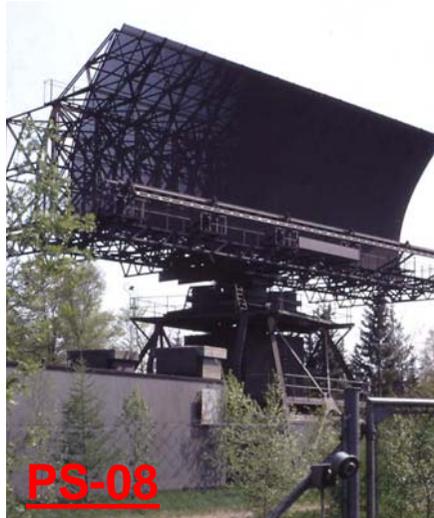


AJ 37





# Radar Sensors 1972 1980



## High Finders





# Hight Finders 1972 1980



**PH-13**



**PH-39**



**PH-12**



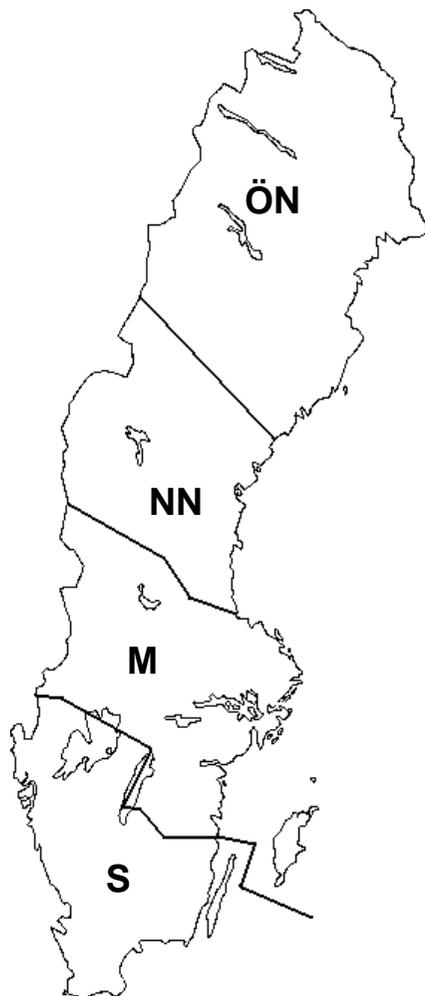
**PH-40**







- 47 | 48 - 56 | 57 - 65 | 66 - 71 | 72 - 80 | **81 - 92** | 93 - 00 | 01 -



## 1981 - 1992

- Radar sensors
- Hight Finders
- C2 Facilities



JA 37





# Radar Sensors 1981 1992

## High Finders



PS-65



PS-66



PS-870



PS-15



PS-860





# Hight Finders 1981 1992

**PH-13**



**PH-39**

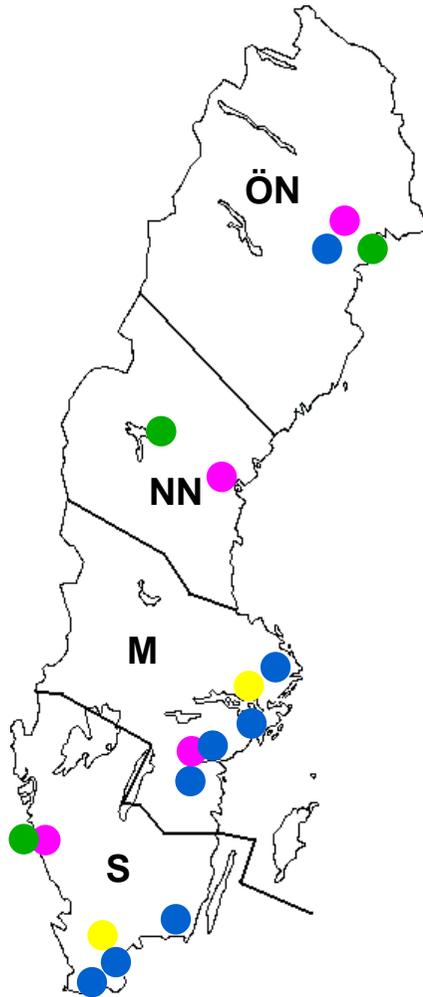


**PH-40**





# C2 Facilities 1981 1992



● AOC (Lfc 1)



● SOC (Rrgc/F)



● AOC (Lfc 2)

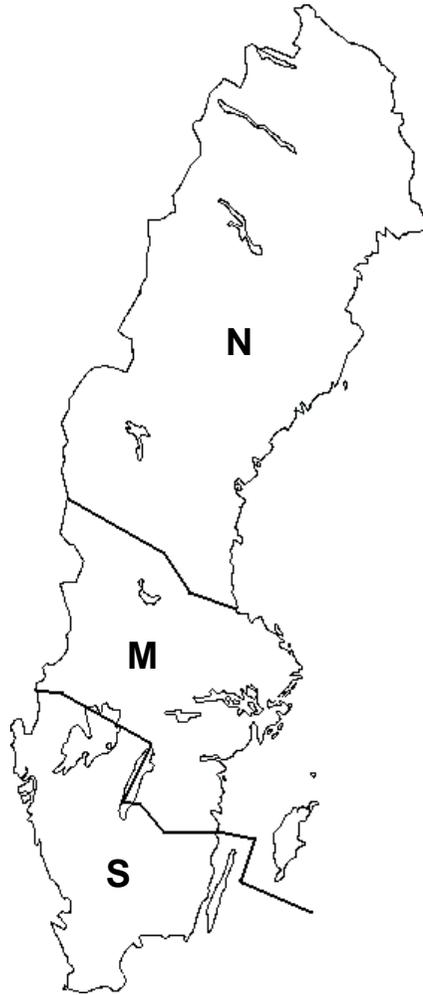


● SOC mobile (Rrgc/T)





- 47 | 48 - 56 | 57 - 65 | 66 - 71 | 72 - 80 | 81 - 92 | 93 - 00 | 01 -



**1993 - 2000**

- Radar sensors
- C2 Facilities
- FV2000
- Tactical loop
- LOMOS



SWEDISH ARMED FORCES  
HEADQUARTERS

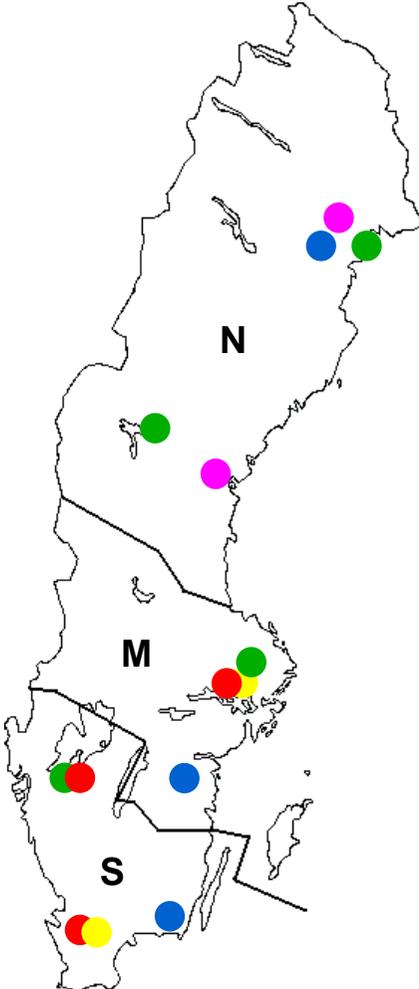


# Radar Sensors 1993 2000



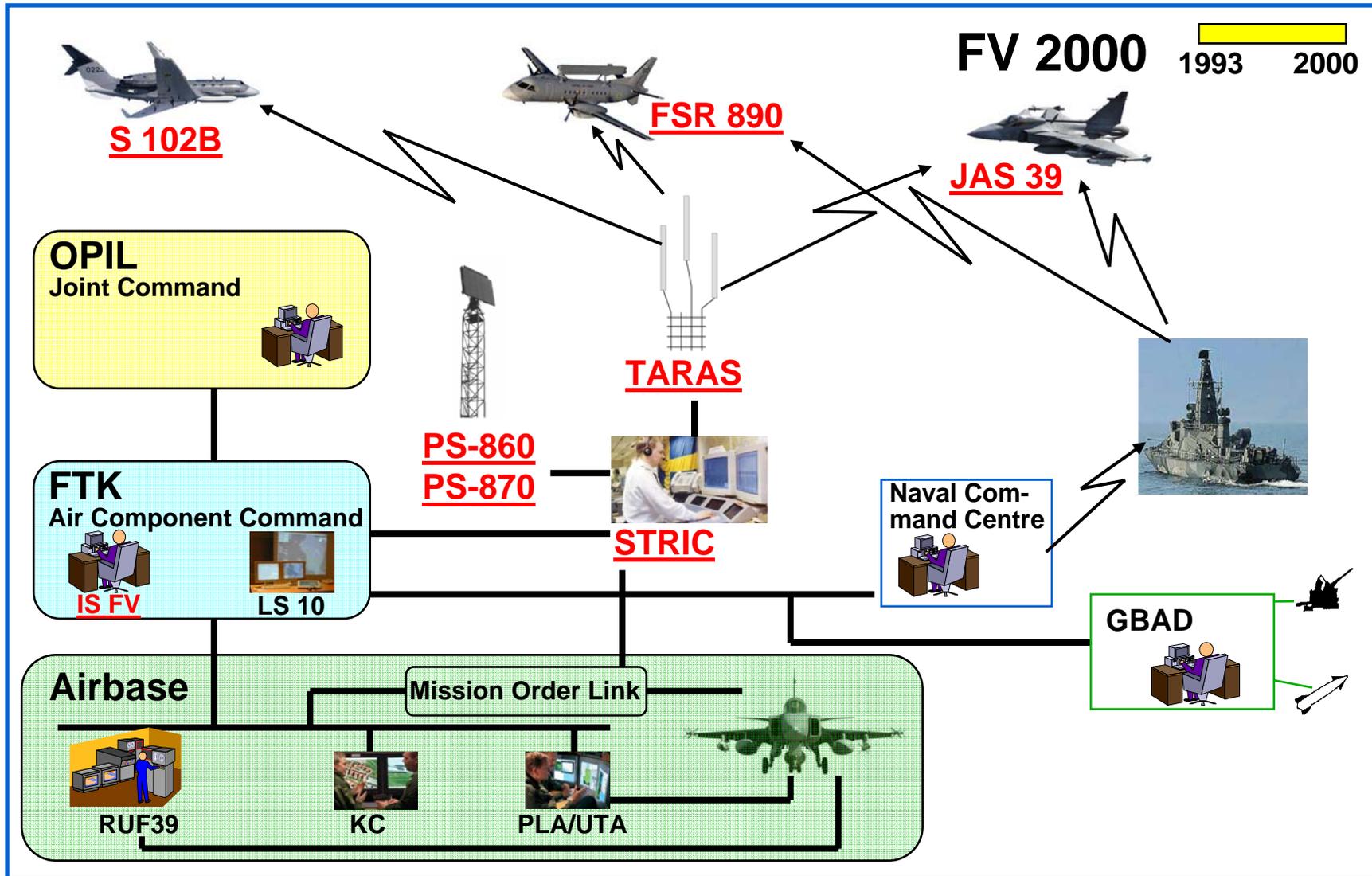


## C2 Facilities 1993 2000



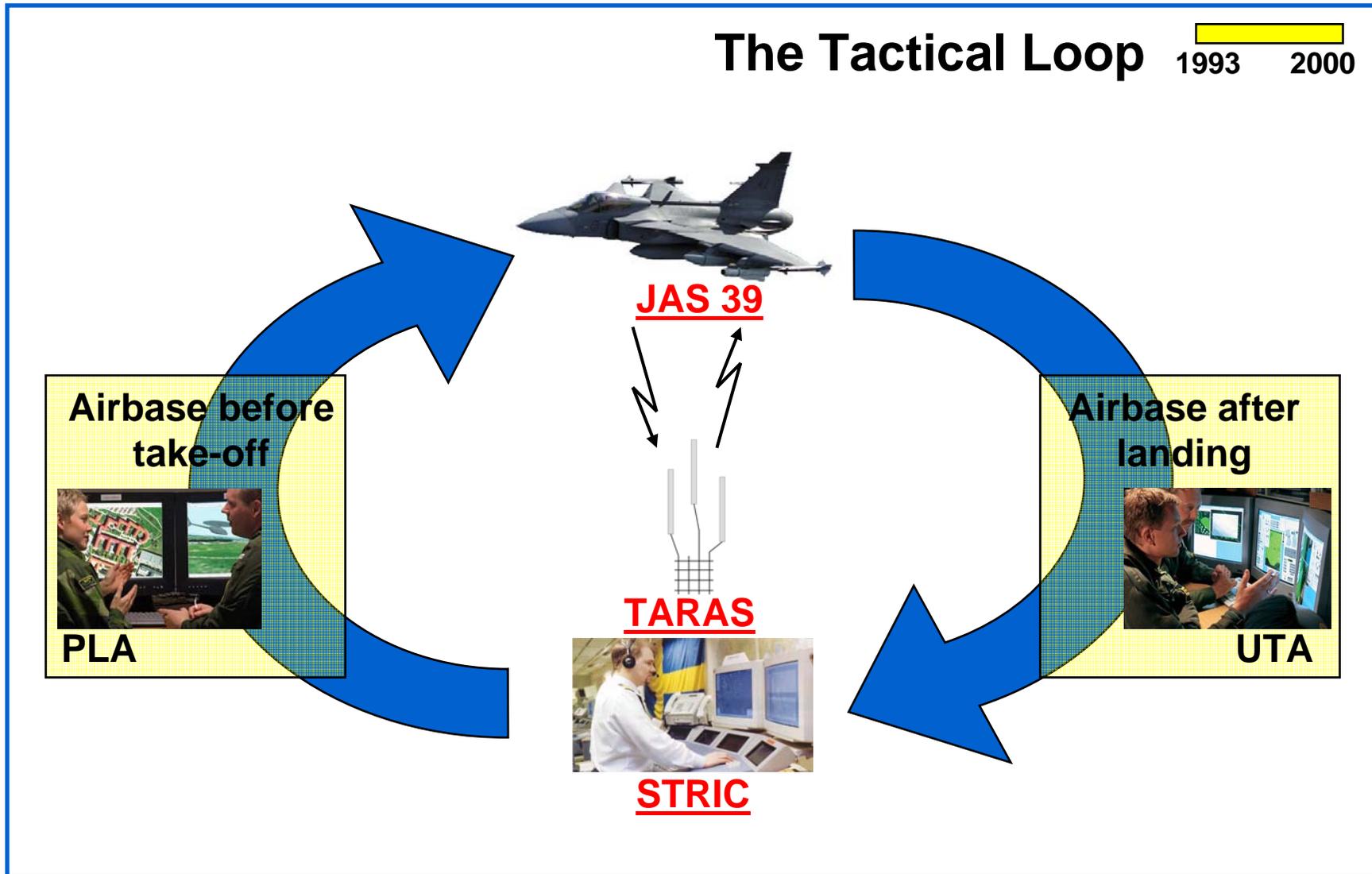
- AOC (Lfc 2/Lfuc)
- SOC (Rrgc/F)
- AOC (StriC/LE)
- AOC (Lfc 1)
- SOC mobile (Rrgc/T)





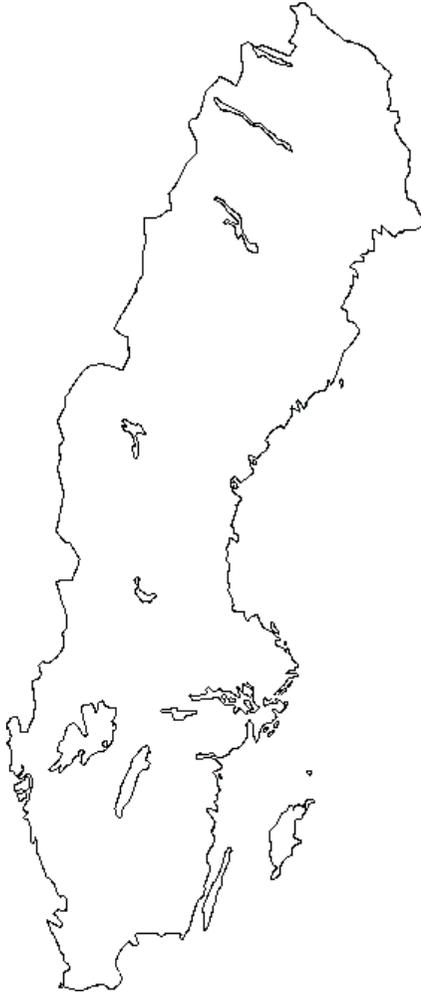


# The Tactical Loop 1993 2000





- 47 | 48 - 56 | 57 - 65 | 66 - 71 | 72 - 80 | 81 - 92 | 93 - 00 | 01 -



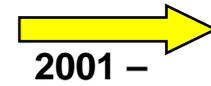
**2001 -**

- Radar sensors
- C2 Facilities
- FV2000, new version 2007 –
- International and joint, 2008 –
- Joint Training Facility





# Radar Sensors



**FSR 890**



**PS-870**



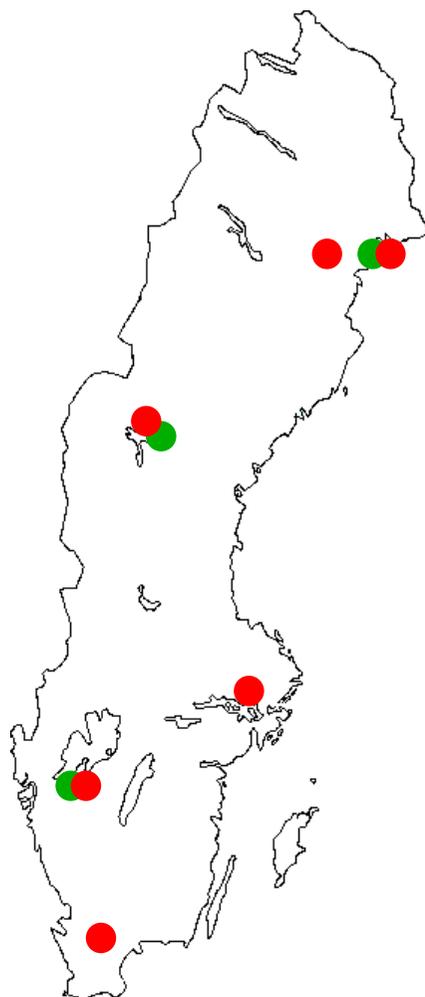
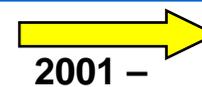
**PS-860**

**PS-861**





## C2 Facilities

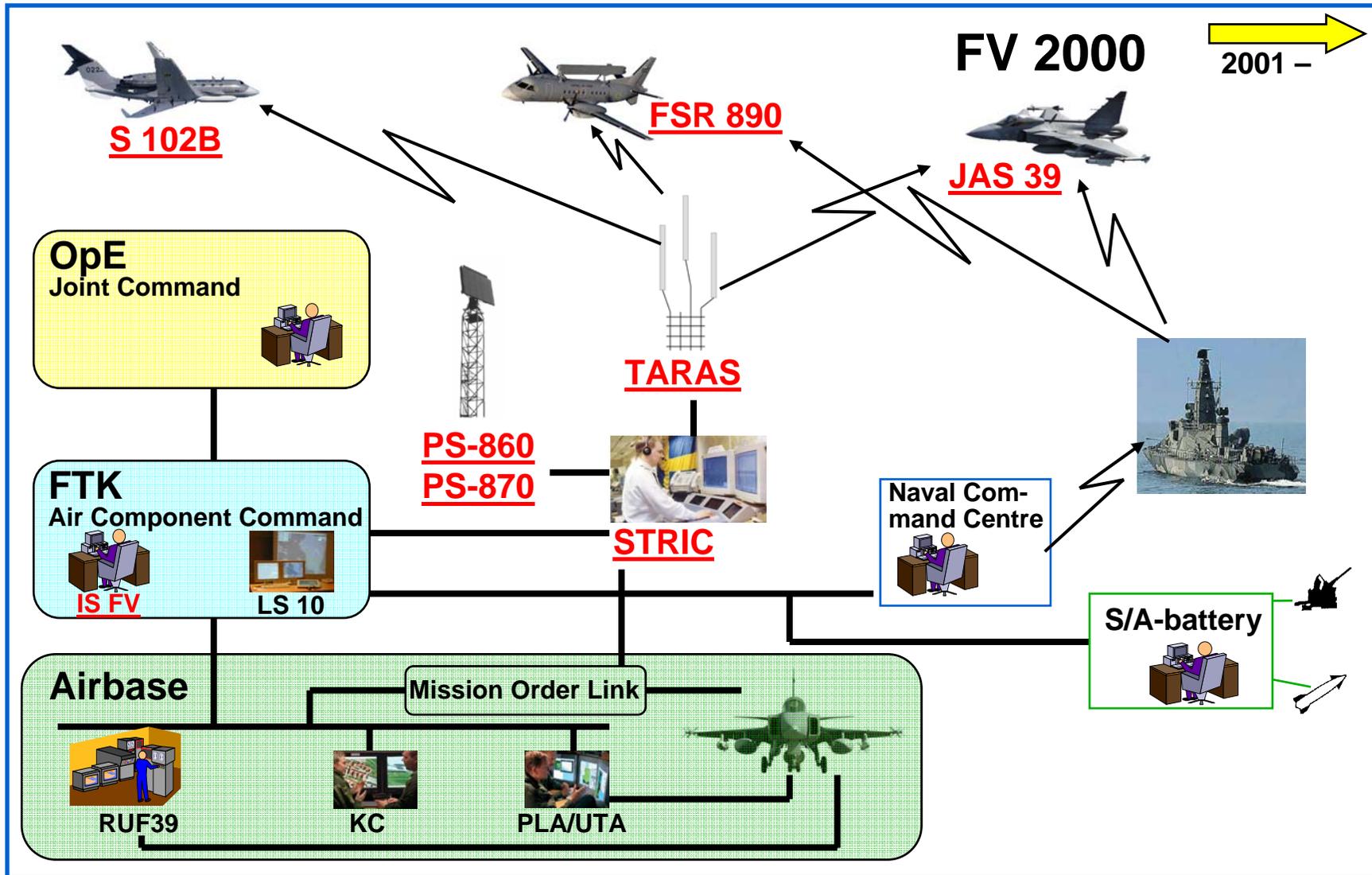


● AOC (StriC/LE)



● SOC mobile (Rrgc/T)



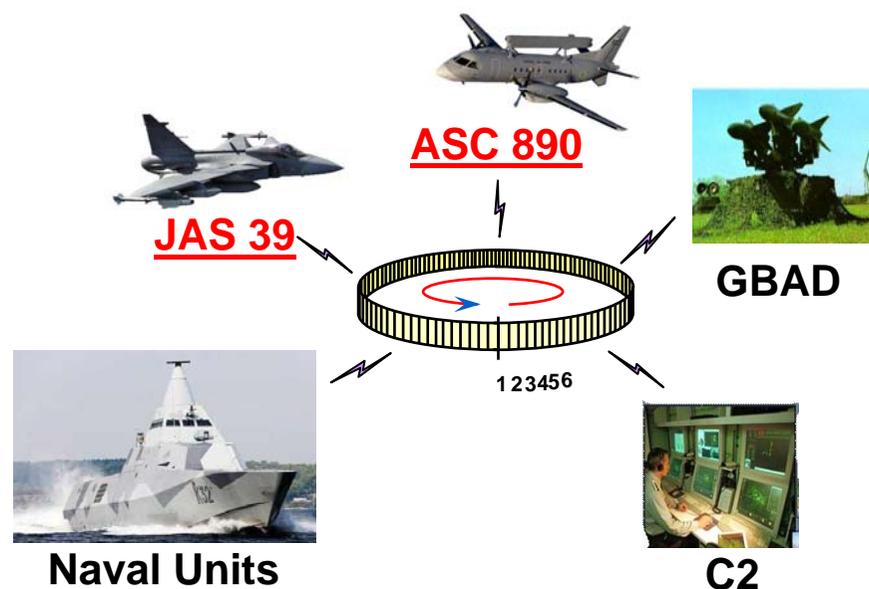




## International and joint

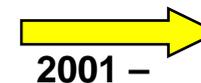


- Political decision in 2003
- Participate in international operations together with other nations Army, Navy and Air Force units
- Requires international adapted technical and tactical systems; IFF, HQII, Link-16, ADatP3





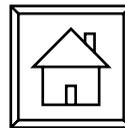
## Joint Training Facility



- **iGC2F (interim Ground Command and Control Facility)**
- **Joint Training Facility for the Swedish Armed Forces**
- **2008- 2015?**
- **L-16, HQII, IFF**

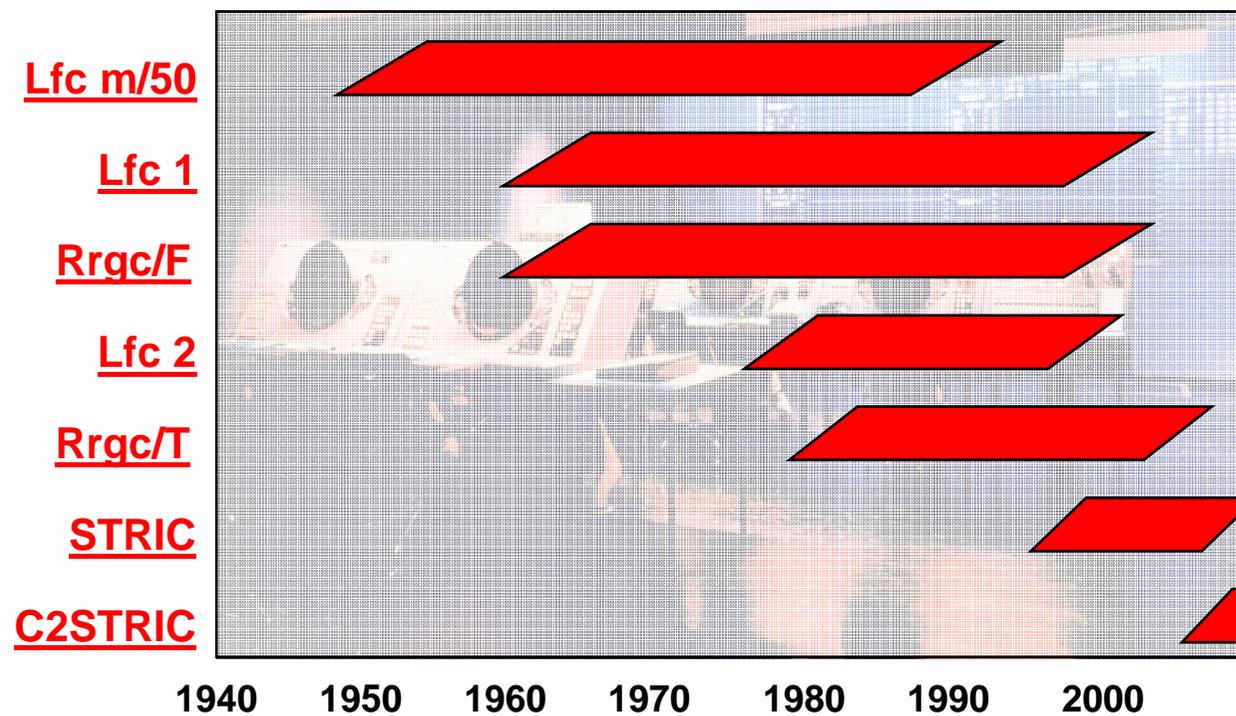


# BILDSPEL SLUT



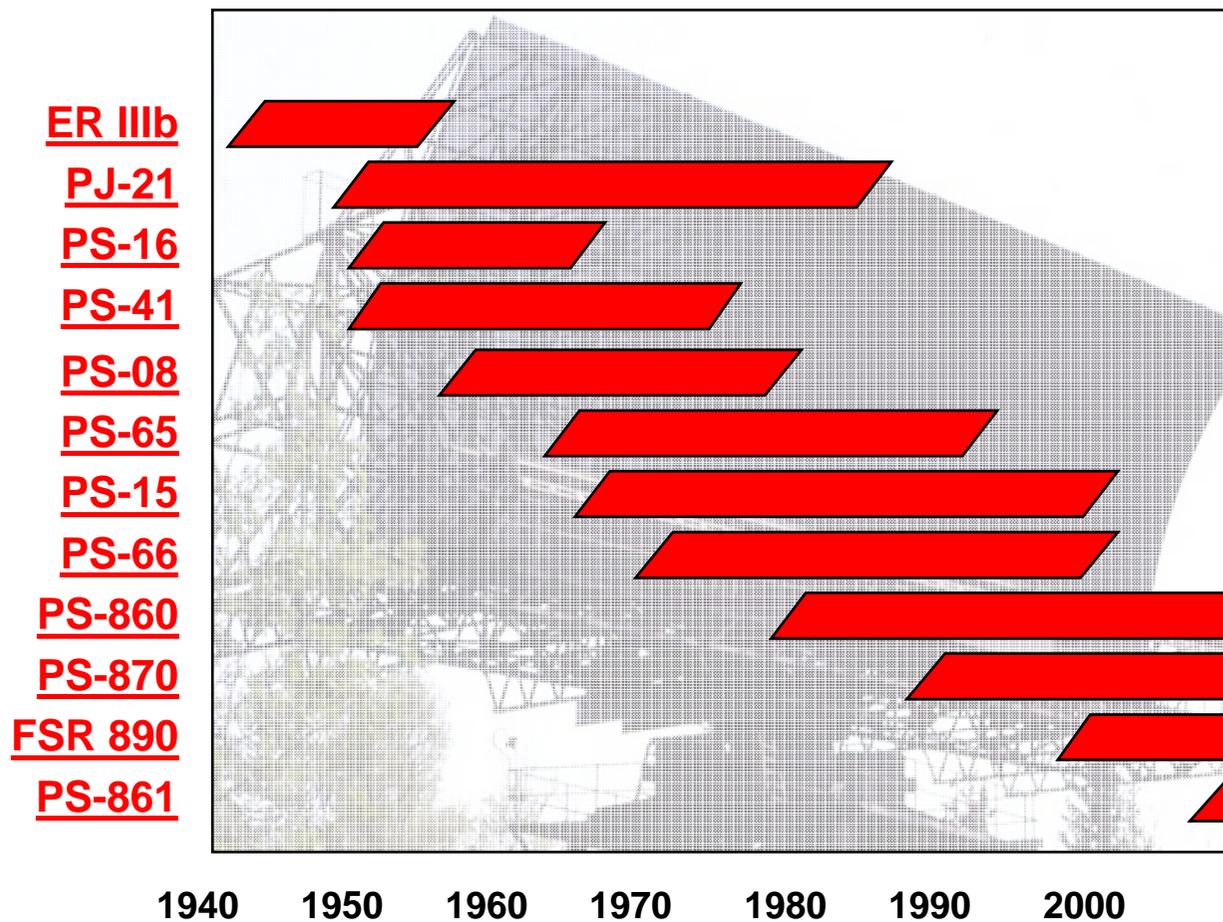


## C2 Systems



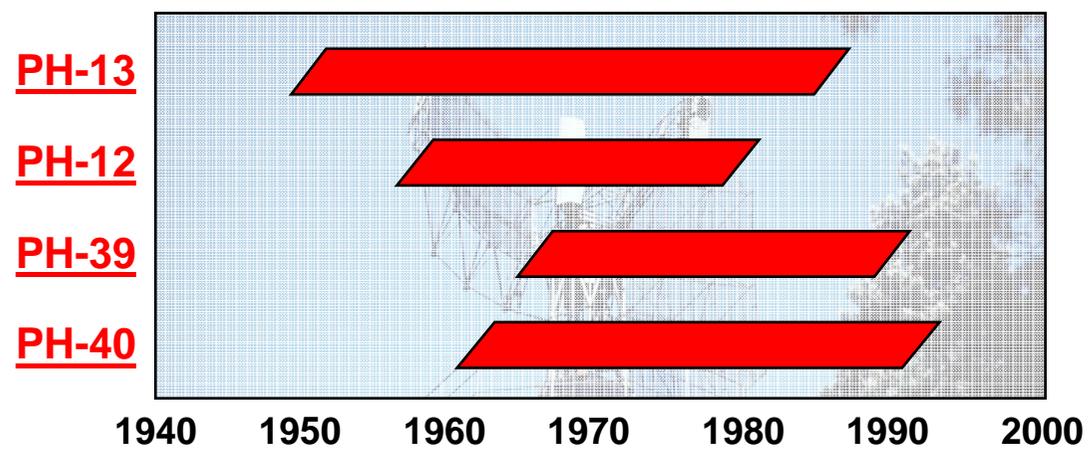


# Military Radar



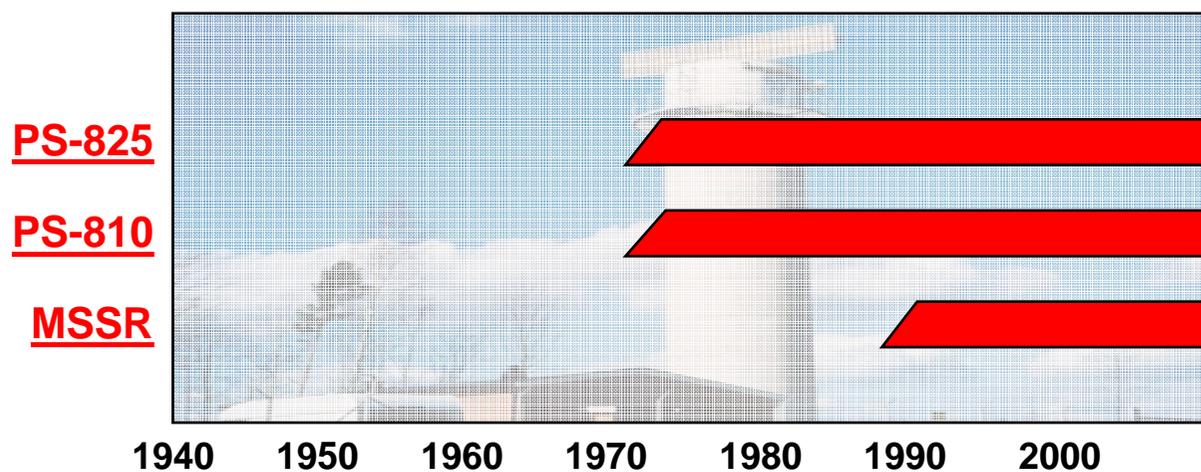


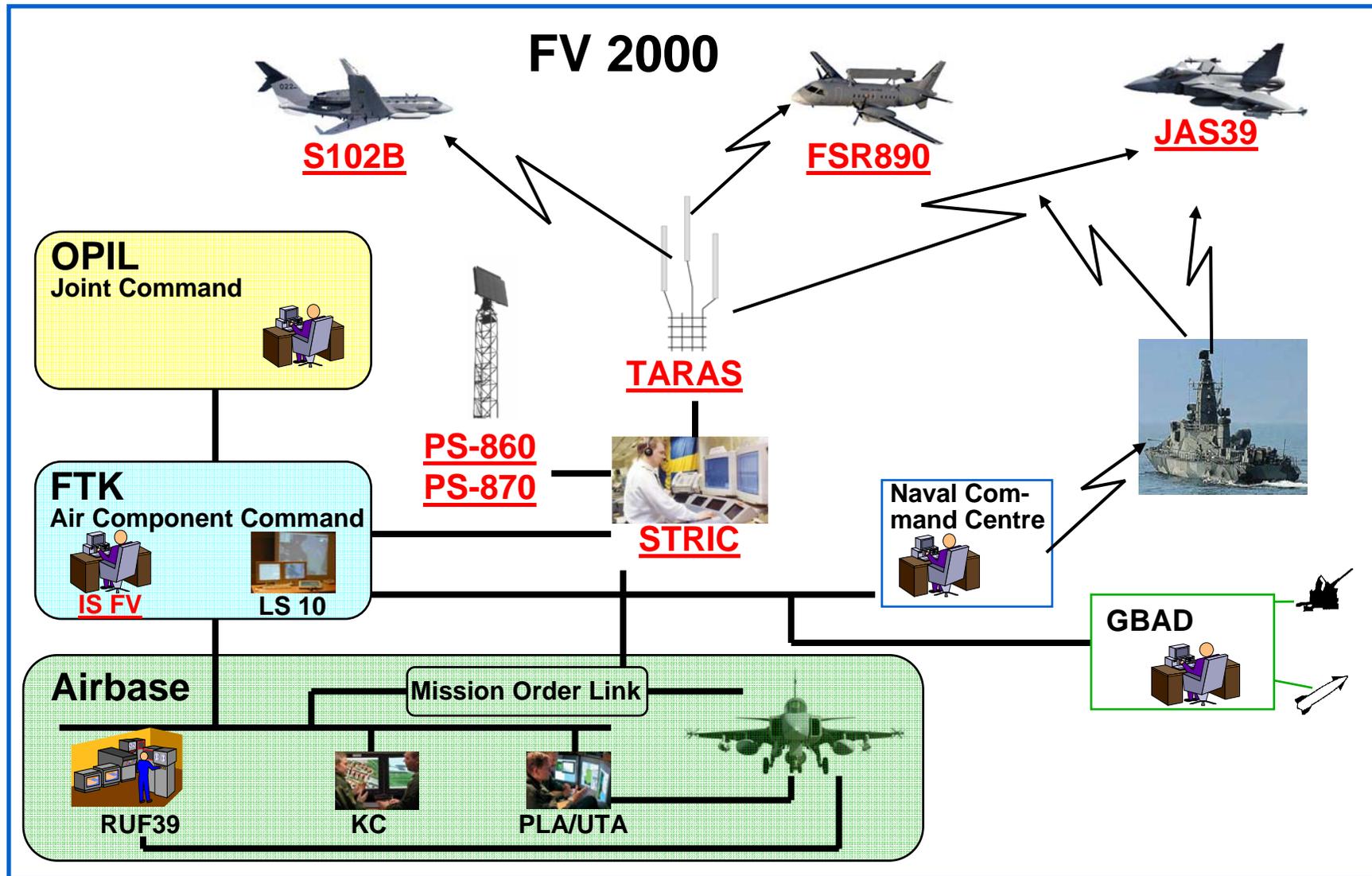
# Hight Finders





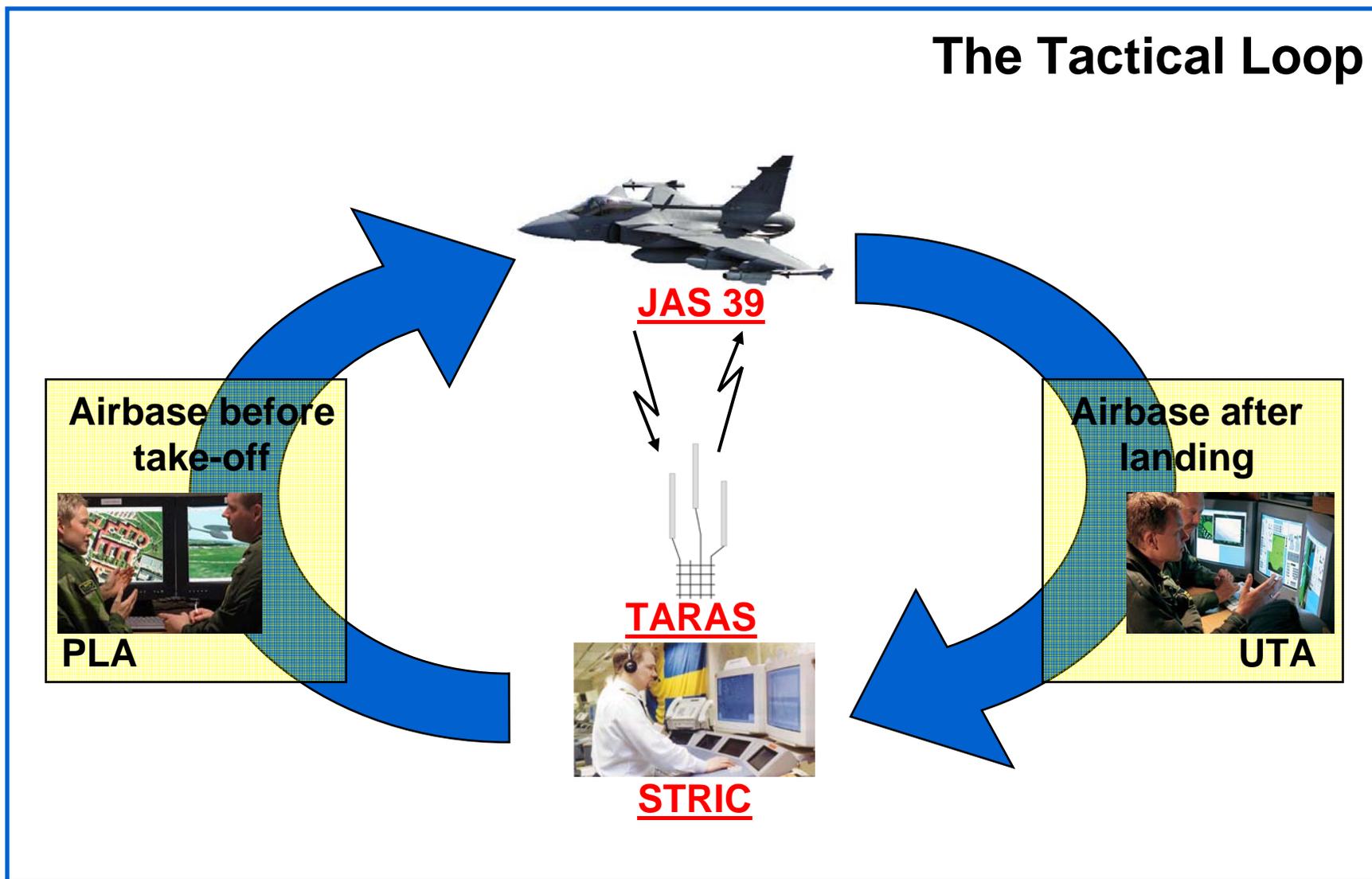
# ATS Radar







# The Tactical Loop





# Tactical Data Links

1940 1950 1960 1970 1980 1990 2000



## J 35 Draken G/A-link

- Intercept control using datalink
- One primary target, Discrete Commands Vectoring





# Tactical Data Links

1940 1950 1960 1970 1980 1990 2000



## JA 37 Viggen G/A-link

- Intercept control using datalink
- One primary target, 4 Secondary targets  
Discrete commands, GBAD-positions,  
Pointer, Vectoring, Silent intercept

## JA 37 Viggen F/F-link

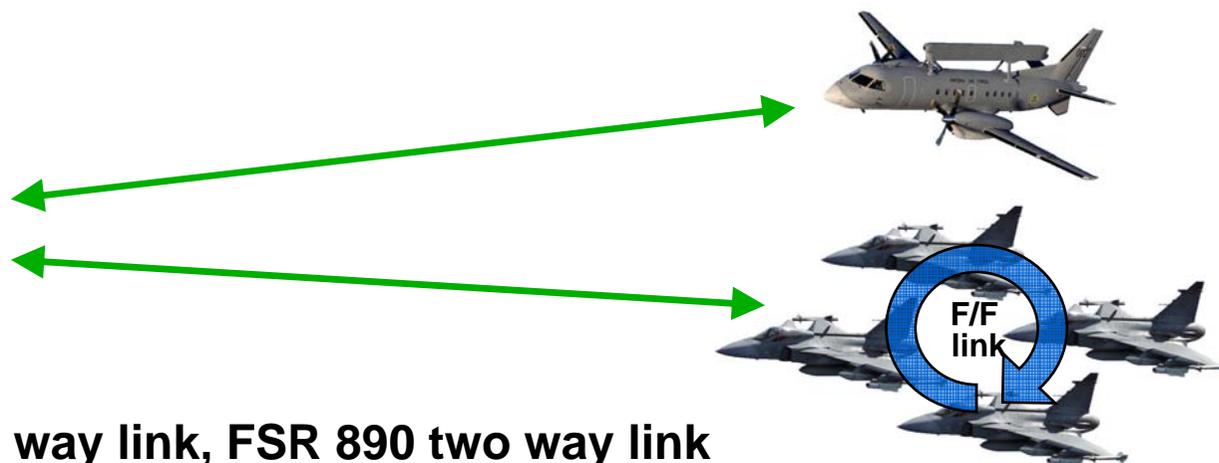
- Engaged targets
- Combat status, Jammer strobe, Discrete commands





# Tactical Data Links

1940 1950 1960 1970 1980 1990 2000



## JAS 39 Gripen two way link, FSR 890 two way link

- Total RAP
- Transmit and receive imagery
- Receive sensor-info from JAS 39 to ground (e.g tracks, jammer strobes)
- Two-way pointer
- Discrete commands, GBAD-positions, ATO
- Vectoring, silent intercept
- Surveillance picture from FSR 890
- Radar remotely controlled from STRIC





# SYSTEMBILDER



SWEDISH ARMED FORCES  
HEADQUARTERS



# LOMOS

1940 1950 1960 1970 1980 1990 2000



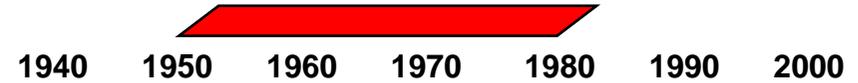
- Operational 1994 -
- Computer supported compilation of reports
- Oc (Observations centre)
- Obs (Observations site)



SWEDISH ARMED FORCES  
HEADQUARTERS



# Lfc m/50



Operational: 1950~1980  
11 units  
L M Ericsson/Sweden





# Lfc 1

1940 1950 1960 1970 1980 1990 2000

Operational: 1964-2001  
2 units  
Marconi/UK



SWEDISH ARMED FORCES  
HEADQUARTERS

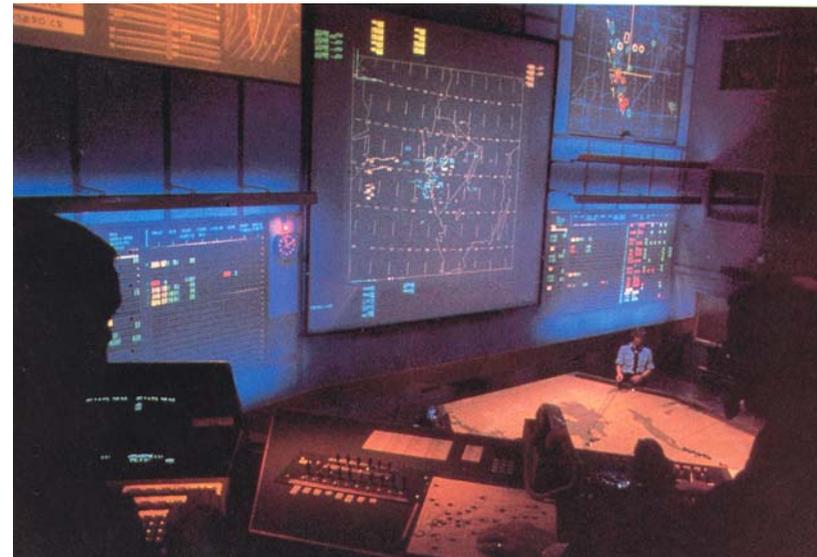


# Lfc 2/Lfuc

1940 1950 1960 1970 1980 1990 2000



Operational: 1978-1998  
4 units  
Singer Librascope/USA



SWEDISH ARMED FORCES  
HEADQUARTERS



# Rrgc/F

1940 1950 1960 1970 1980 1990 2000

Operational: 1967-2001  
8 units  
Standard Radio/Sweden



SWEDISH ARMED FORCES  
HEADQUARTERS



# Rrgc/T

1940 1950 1960 1970 1980 1990 2000

Operational: 1984-2004  
4 units  
Marconi/UK



SWEDISH ARMED FORCES  
HEADQUARTERS



# STRIC

1940 1950 1960 1970 1980 1990 2000

Operational: 1998-  
3 StriC + 3 LE  
Celsius/Sweden



SWEDISH ARMED FORCES  
HEADQUARTERS



# C2STRIC

1940 1950 1960 1970 1980 1990 2000

Operational: 2007-  
4 units (planned)  
Saab/Sweden



SWEDISH ARMED FORCES  
HEADQUARTERS

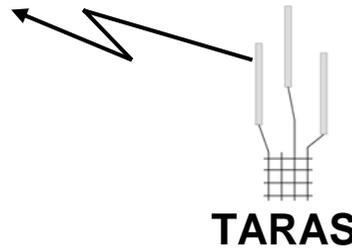


# IS FV

1940 1950 1960 1970 1980 1990 2000



JAS39



TARAS

**FTK**  
Air Component Command



IS FV



C2STRIC

**Airbase**



IS FV

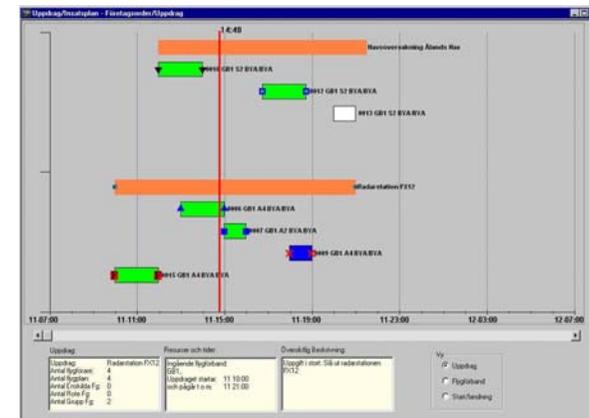


IS FV

Mission Order Link



- Operational 2003 – (FKC/S and two airbases)
- Information System Airforce





## ER IIIb

1940 1950 1960 1970 1980 1990 2000

Operational: 1944-56

~ 30 units

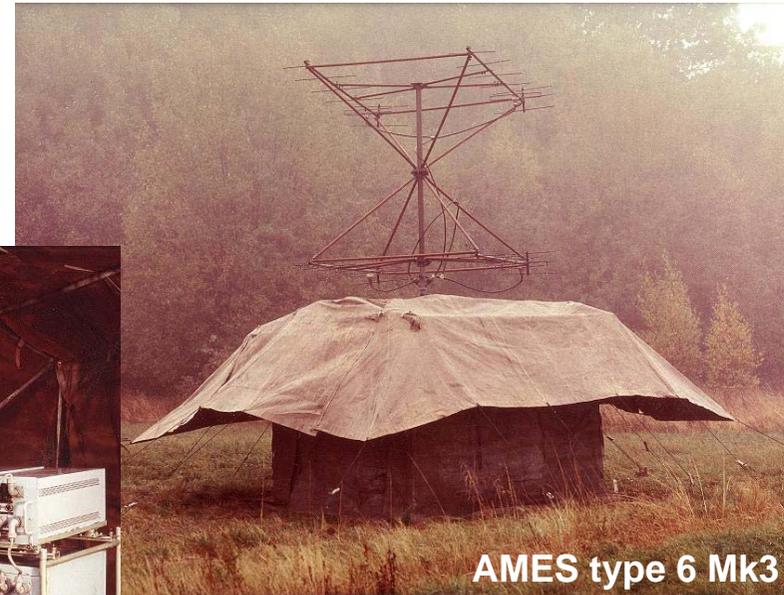
High level 2D

Range: 70 km

500 MHz

85 kW

AMES/UK



AMES type 6 Mk3



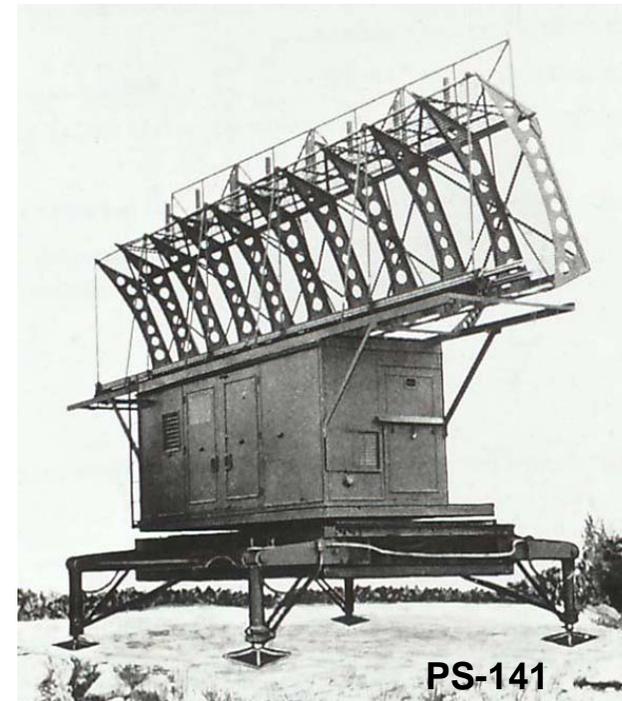
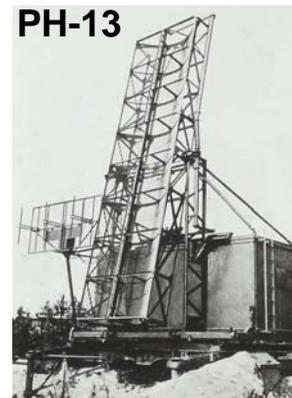
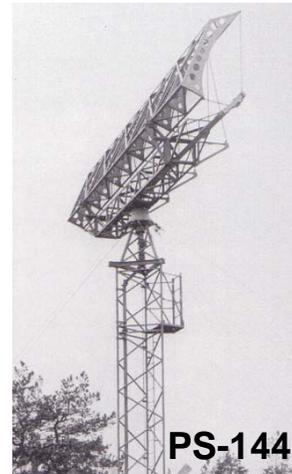
SWEDISH ARMED FORCES  
HEADQUARTERS



# PJ-21



Operational: 1950-86  
~ 25 units  
High level 2D + High Finder  
Range: 200 km  
3 GHz, S-band  
500 kW  
Marconi/UK





# PS-16

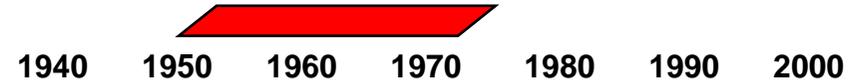


Operational: 1951-65  
5 units  
High level 2D  
Range: 250-300 km  
100 MHz  
500 kW  
Marconi/UK





# PS-41



Operational: 1951-75  
20 units  
High level 2D  
Range: 250 km  
1.2 GHz, L-band  
500 kW  
Bendix/USA

AN/TPS-1S



PS-41 in Congo





# PS-08

1940 1950 1960 1970 1980 1990 2000



**C2-cell 08 (Standard Radio/Sweden)**

Operational: 1957-79

4 units

High level 2D/IFF

Range: 400 km

3 GHz, S-band

2.5 MW

Decca/UK

Harry, Dick, Tom, Fred



**Type 80 Mk3**



SWEDISH ARMED FORCES  
HEADQUARTERS



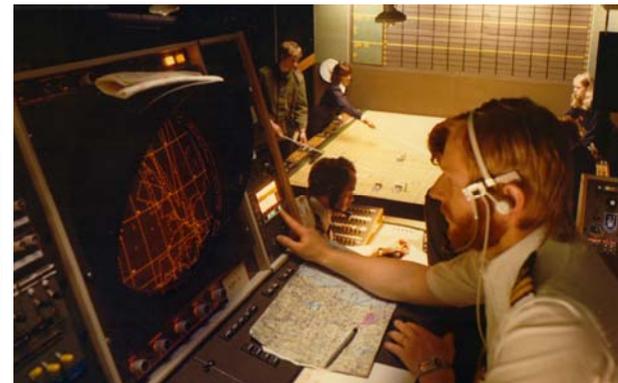
# PS-65

1940 1950 1960 1970 1980 1990 2000

Operational: 1965-93  
9 units  
High level 2D/IFF  
Range: 300 km  
1.3 GHz, L-band  
2.3 MW  
CSF/France  
Antenna – Selenia/Italy



**C2-cell 65  
(Standard Radio/Sweden)**



SWEDISH ARMED FORCES  
HEADQUARTERS

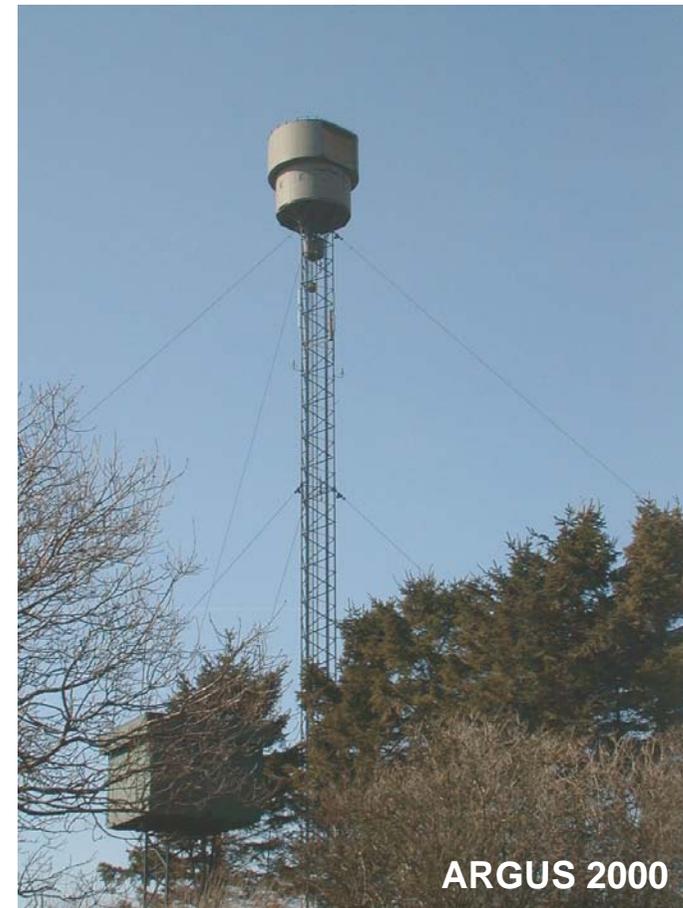


## PS-15

1940 1950 1960 1970 1980 1990 2000



Operational: 1967-99  
15 units  
Low level 2D (4 heights)/IFF  
Range: 200 km  
5.5 GHz, C-band  
1 MW  
Selenia/Italy



SWEDISH ARMED FORCES  
HEADQUARTERS



## PS-66

1940 1950 1960 1970 1980 1990 2000



Operational: 1970-2005  
5 units  
High level 3D/IFF  
Range: 400 km  
3 GHz, S-band  
20 MW  
Thomson CSF/France



**C2-cell 66**  
**(Standard Radio/Sweden)**

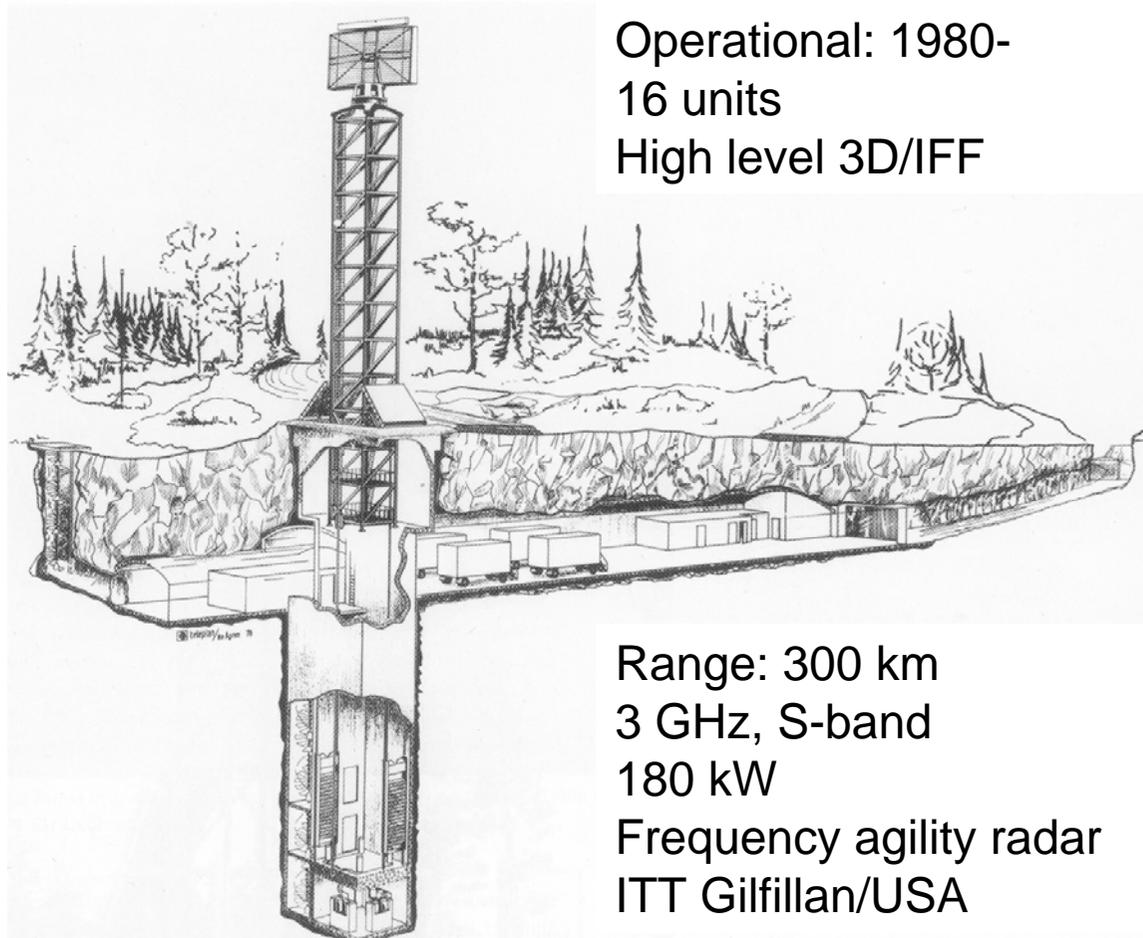


SWEDISH ARMED FORCES  
HEADQUARTERS



# PS-860

1940 1950 1960 1970 1980 1990 2000



Operational: 1980-  
16 units  
High level 3D/IFF

Range: 300 km  
3 GHz, S-band  
180 kW  
Frequency agility radar  
ITT Gilfillan/USA



AN/SPS-48 S-3D





# PS-861

1940 1950 1960 1970 1980 1990 2000

Operational: 2008

8 units

High-level 3D

Range: 450 km

3 GHz, S-band

180 kW

Frequency agility radar

ITT Gilfillan/USA



SWEDISH ARMED FORCES  
HEADQUARTERS



## PS-870

1940 1950 1960 1970 1980 1990 2000

Operational: 1988-  
28 units  
High level 2D/IFF  
Range: 100 km  
5.5 GHz, C-band  
44 kW  
ITT Gilfillan/USA



SWEDISH ARMED FORCES  
HEADQUARTERS



# PS-810

1940 1950 1960 1970 1980 1990 2000

Operational: 1972-  
6 units  
High level 2D  
Range: 200 km  
1 GHz, L-band  
2 MW  
Selenia/Italy  
ATS radar



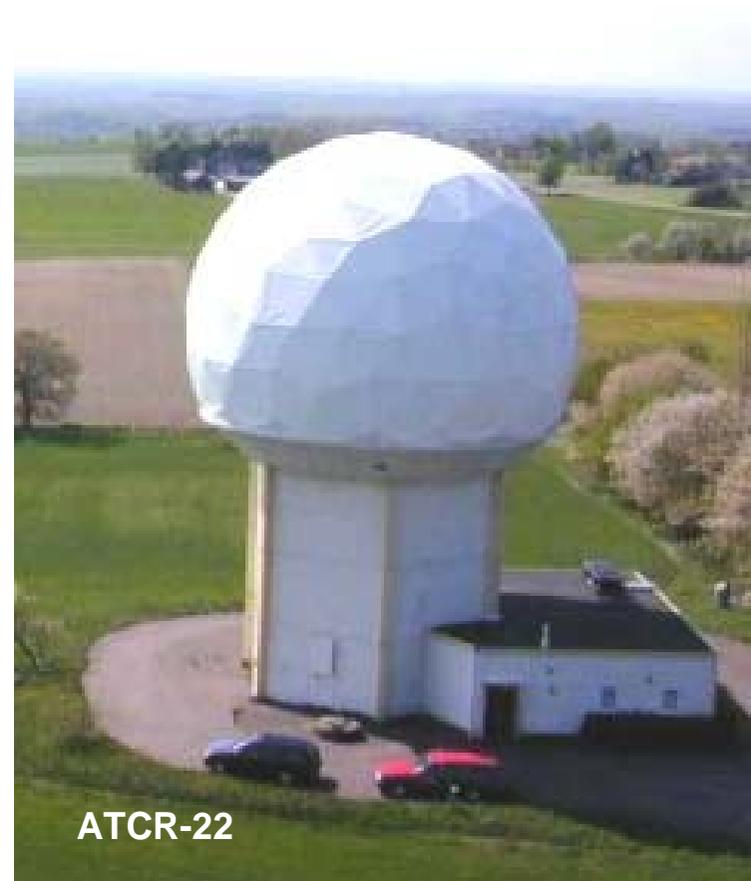
SWEDISH ARMED FORCES  
HEADQUARTERS



## PS-825

1940 1950 1960 1970 1980 1990 2000

Operational: 1971-  
5 units  
High level 2D/SSR  
Range: 200 km  
1 GHz, L-band  
2 MW  
Selenia/Italy  
Civilian ATS radar



ATCR-22



SWEDISH ARMED FORCES  
HEADQUARTERS



# MSSR

1940 1950 1960 1970 1980 1990 2000

Operational: 1989-  
16 units  
Range: 500 km  
Cossor/UK  
Civilian ATS radar



SWEDISH ARMED FORCES  
HEADQUARTERS



## FSR 890

1940 1950 1960 1970 1980 1990 2000



- AEW
- Operational 1998 -
- 6 aircrafts, 4 radarsystems
- S 100B "Argus" (SAAB 340 AEW)
- Greece, Brazil, Mexico, Paqistan

- PS-890 , "Erieye radar" (Ericsson Microwave)
- 2 GHz – 4 GHz, S-band
- Long-range pulse doppler radar
- Including sea surveillance mode
- Radar remote controlled
- Multifunction workstations





## ASC 890

1940 1950 1960 1970 1980 1990 2000



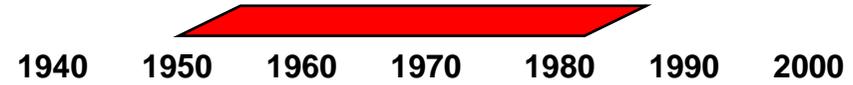
- **AEW**
- **Operational 2008 -**
- **2 radarsystems**
- **S 100D "Argus" (SAAB 340 AEW)**
- **3 Operators**
- **L-16, HQII, IFF**



**SWEDISH ARMED FORCES**  
HEADQUARTERS



# PH-13

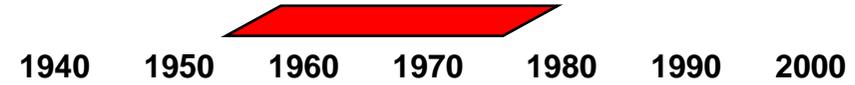


Operational: 1950-86  
~ 25 units  
Height Finder  
3 GHz , S-band  
500 kW  
Marconi/UK

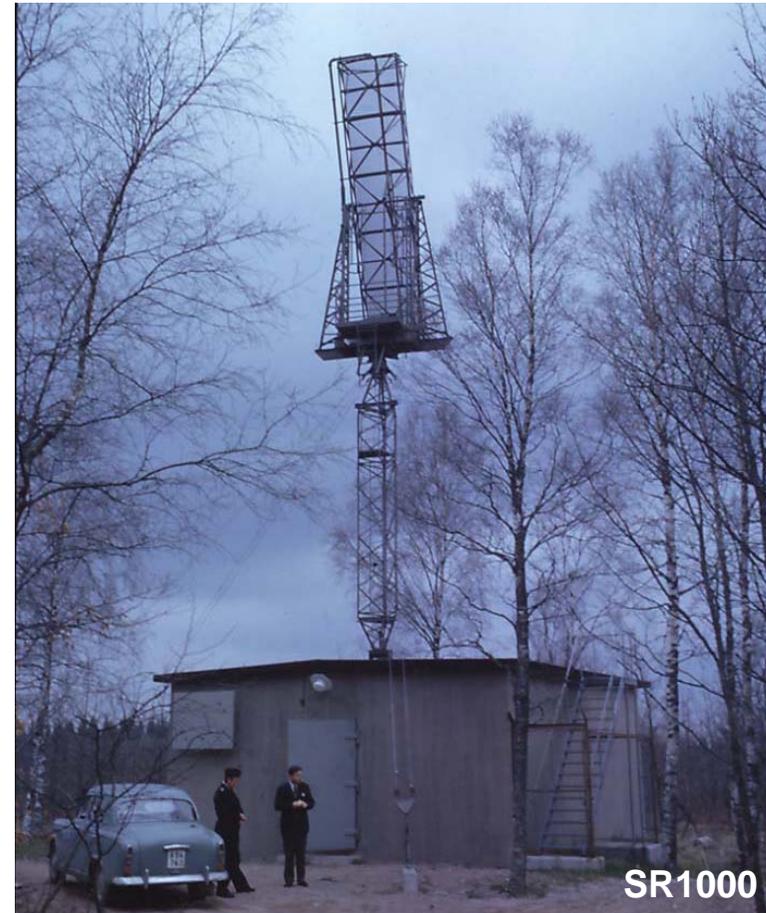




# PH-12



Operational: 1957-79  
4 units  
Hight Finder  
3 GHz , S-band  
2.5 MW  
Marconi/UK





# PH-40

1940 1950 1960 1970 1980 1990 2000



Operational: 1962-93  
6 units  
Hight Finder  
Range 400 km  
3 GHz, S-band  
2.2 MW  
Plessey/UK



SWEDISH ARMED FORCES  
HEADQUARTERS



# PH-39

1940 1950 1960 1970 1980 1990 2000



Operational: 1965-90  
7 units  
3D/Height Finder  
3 GHz S-band  
2.2 MW  
Plessey/UK



SWEDISH ARMED FORCES  
HEADQUARTERS

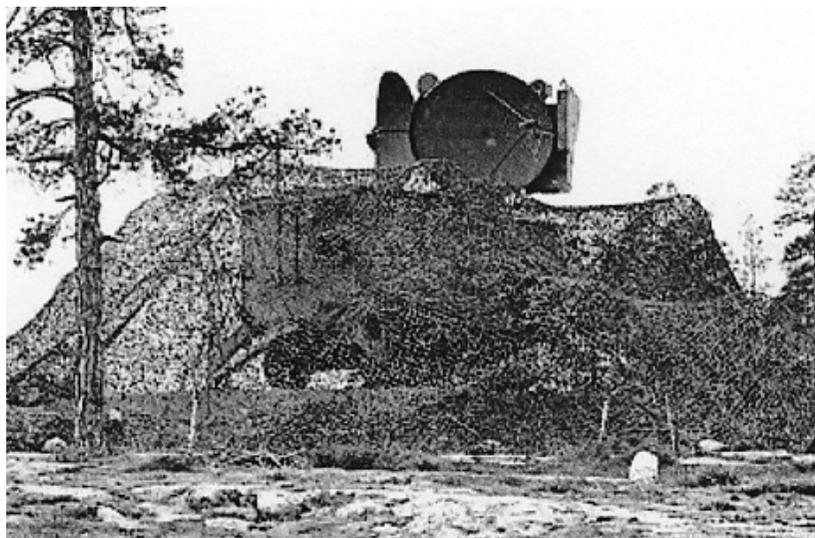


# Rb 68, Bloodhound



**Operational: 1963-78**

**Controlled from AOC (Lfc 1)**



**SWEDISH ARMED FORCES**  
HEADQUARTERS



# TARAS

1940 1950 1960 1970 1980 1990 2000



- Operational 1995 -
- Tactical Radio System
- Analog radio
- Digital radio, encrypted
- Secure voice
- Mission order link
- Two way data link
- F/F link
- Relay function





# JAS 39 Gripen

1940 1950 1960 1970 1980 1990 2000

- Operational 1997 –
- Multi-role aircraft
- 4:th generation
- South Africa, Hungary, Czech Republic
- Long-range multi-purpose pulse doppler radar, PS-05
- Multi-target track-while-scan
- Multiple priority target tracking



SWEDISH ARMED FORCES  
HEADQUARTERS



## S 102B

1940 1950 1960 1970 1980 1990 2000

- Operational 1992-
- ELINT (Electronic Intelligence) missions
- Gulfstream IV G
- S 102B "Korpen" (the Raven)
- ELINT operators under the supervision of the FRA (The National Defence Radio Establishment)



The two aircraft got the individual names "Hugin" and "Munin" after the Scandinavian ancient God Oden's two ravens, who saw everything that happened in the world.

