

BELGIAN AIR FORCE

RADAR STATION SENTERZAKE

B.O.S.S. - BIRD OBSERVATION SYSTEM SENTERZAKE

FURTHER STEPS AND IMPROVEMENTS

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Bird Observation System SEMMERZAKE

1. At the BSCE-ROMA 84 the BELGIAN Air Force presented for the first time its new project for Bird observation by means of Radar, called BOSS.
2. The radar situated at the Radar Station SEMMERZAKE, is a 3D-Radar and is used for Air Traffic Control. The aim has always been NOT to change the radar configuration, so that the operations necessary for bird observation would never disturb the normal routine work namely Air Traffic Control.
Therefore, the BOSS is used in an "ON-LINE" configuration, which allows the operator to perform Bird Observation without influencing the ATC-capacity.
3. To explain the observation-procedure which has been accepted, it is necessary to recall the history of the most important steps and improvements since 84.
4. During the spring of 1984 the BOSS-system was developed.

This computer program is based up on the following principles :

- during a certain time, the incoming plots are stored in the system file, while remaining visible on the scope. This gives PLOTLINES, a traditional picture in fact of AFTERGLOW which used to appear on the 2D-radar at the time that Bird Observation was performed with a POLAROID-camera.
- These plots are submitted to well-defined criteria so that only the returns of the primary radar are accepted, this means also that only plots WITHOUT IFF are accepted.
- The effect of ground clutter is eliminated by a range filter, as well as all plots within a range of 10 NM.
- On the bottom of the radar display 4 figures are displayed. These are the plots which are counted in the different height layers.
- These layers were maintained from the start of the project and they are as follows :

| | | |
|-------|---|--------|
| 0 | - | 2000' |
| 2000' | - | 4500' |
| 4500' | - | 8000' |
| 8000' | - | 10000' |

- These layers can be changed easily by the system programmer, if required by FLIGHT SAFETY COMMAND.
5. During the spring migration 84 the BOSS system was used for the first time in its experimental phase. In those days the calibration was NOT yet performed, which meant that NO BIRD-INTENSITY could be attached to the figures we received; in fact our main target, to determine a bird intensity from 0 till 8 at ANY moment, was NOT yet possible at that time.
 6. In order to reach a final solution and for calibration purposes, THREE testing periods were used : spring and fall 84 and spring 85.
 7. Step by step following experiments and improvements were undertaken :
 - In the spring period 84 we suffered a serious overload of the computer due to the fact that the whole scope was interrogated, so that the plotfile was saturated very fast, which also endangered our ATC capacity.

Therefore we divided the scope in FOUR quadrants. The computer interrogating only in one quadrant thus excluding overload of the system.
 - These quadrants were limited in range, as to allow full coverage of BELGIUM.
 - For the observation time of a quadrant 5 MINUTES were maintained for the complete scenario.
 - During 4' 30" a quadrant is interrogated in the defined range.
 - All incoming plots are stored in the system file, counted and displayed continuously at the bottom of the scope.
 - During this period the plots can be tracked, providing the operator with H-A-S (Height - Altitude - Speed).
 - After a certain time plotlines are developed which are in fact the birdtracks.
 - A very serious problem were aircraft WITHOUT IFF.

Of course easily visible due to the abnormal plot separation in such a case, BUT they were counted !

To solve this problem : after the second incoming plot, keyboard action makes immediately a real track of the plot, stopping the progress of that plot (becoming track) and ensuring that it is NOT counted anymore.

- After this 4' 30" period, which is in fact the working and build-up phase, the actual observation period starts and takes 30". During these 30", the system automatically replays the 4' 30" recorded picture in 2 seconds, giving a MOVING-DISPLAY.

This moving display is repeated FIVE times, giving a clear and realistic presentation of that bird movement with a displacement effect.

- Also during these 30" the counted figures at the bottom of the scope remain stable which allows the observer to copy them on his working paper.
- Once these 30" moving display have passed the figure on the bottom of the scope shows ZERO's indicating that the system has started the interrogation of the next quadrant in the same manner.
- The interrogation of the whole scope takes 20 minutes and is permanently possible.

8. To attain our main object, the calibration of the BOSS-system in order to obtain the capability of fixing a bird-intensity from 0 to 8 over our country, the whole of 1984 and spring 85 were needed. The second radar station in Belgium, GLONS, is still equipped with the POLAROID system. During the whole of 84 and spring 85, the observations were performed by both units daily. These observations gave us a large amount of information. Maxima and minima plots counted in these periods were studied and compared during THREE migration periods. Taking into account the different patterns of the bird migrations (spring and fall) and the figures observed, the tests gave us satisfaction and the system was calibrated. The BOSS system has been certified and after the spring migration 85, accepted by the Belgian Air Force.

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| PRINCIPLES OF THE PROGRAM |
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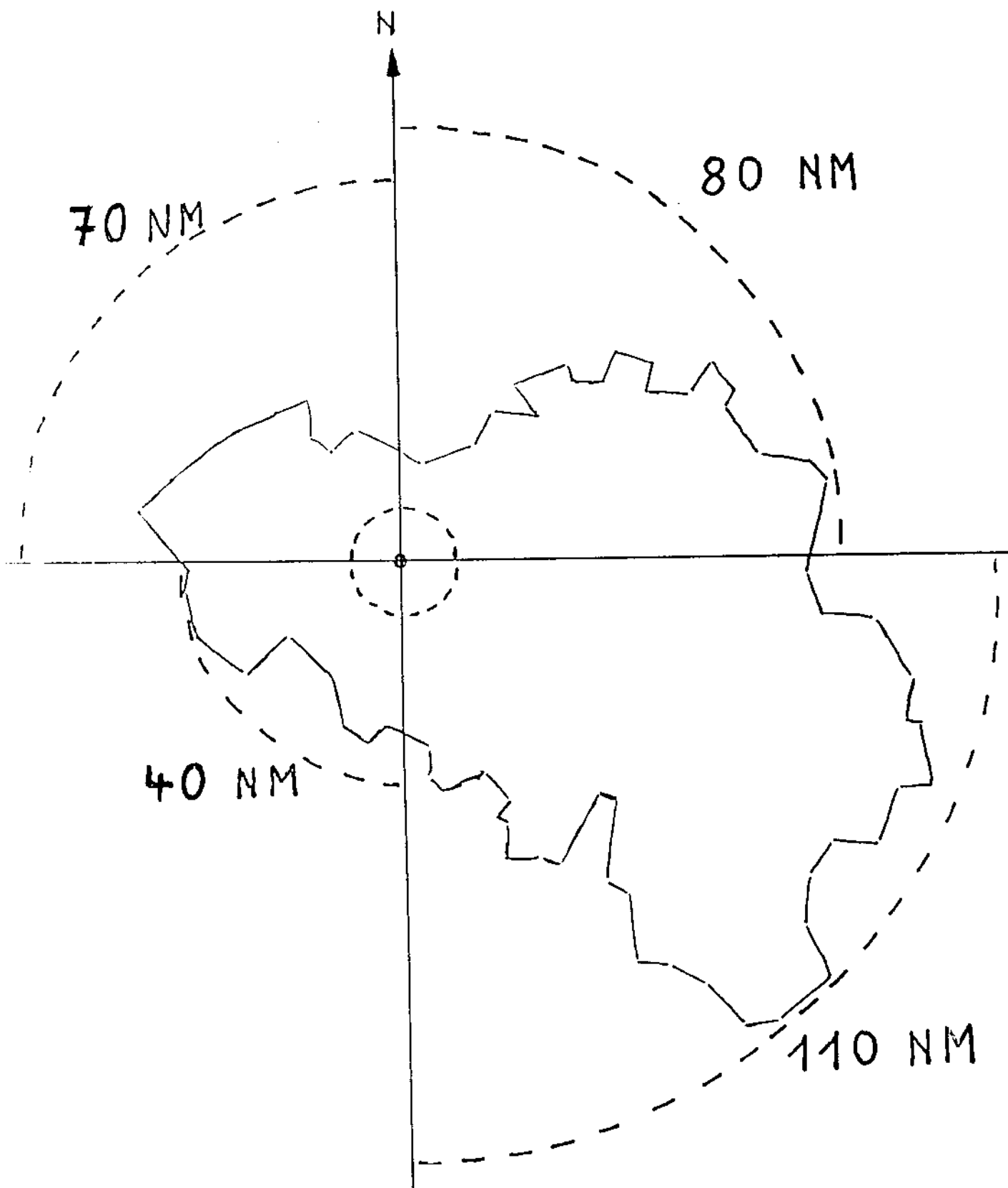
- INCOMING PLOTS ARE STORED
- PLOTS REMAIN VISIBLE → PLOT LINES
- CRITERIA FOR PLOTS : ONLY PRIMARY
- GROUND CLUTTER ELIMINATED (10NM)
- DISPLAY OF COUNTED PLOTS IN
HEIGHT LAYERS

START AND IMPROVEMENTS

- FIRST TRY : SPRING 84
- TEST PERIOD : COMPLETE 84, SPRING 85
- SYSTEM OVERLOAD → SCOPE DEVIDED
IN 4 QUADRANTS
- RANGE IN THE QUADRANTS : ADJUSTED
- A/C WITHOUT IFF : NOT COUNTED
- OBSERVATION ONE QUADRANT : 5 MIN.
- 4'30" : BUILDING-UP PHASE
- 30" : MOVING DISPLAY
- NEXT QUADRANT
- FINAL STEP : CALIBRATION



DEFINE B.I.



HEIGHT LAYERS



NORTH

