

## THE EUROPEAN DATABASE OF MILITARY BIRD STRIKES FROM PROPOSAL TO REALITY

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### ABSTRACT

The requirements a database of bird strikes will have to meet is depending on the kind of questions to be answered. One limiting factor often is the number of available data; very frequently the sample is too small to obtain statistically significant results. In order to overcome this problem the adoption of a joined European database of military bird strikes was promoted at the 20th meeting in Helsinki. Since the joined database will have to serve as the main source of information for many different questions, the set-up has been chosen as broad as possible. This paper describes the progress made so far. Standardization of the structure of the database and the conventions concerning the contents, proved to be extremely important. Both have been the subject of several discussions within the 'Bird Hazard at Low-level working group'. Once agreement was reached, emphasis was put on the introduction of a European Bird Strike Form. In conjunction with the completion of the form a computerprogram was developed enabling efficient handling of the data. Now computerized data storage is within reach, management and feeding of the joined database will be less time consuming and more potential users can be convinced to join the project. This leaves more time to the real purpose of the joined database: extracting information that is relevant to flight safety.

## 1. INTRODUCTION

Bird strike risks differ from situation from to situation. For instance, the chance that a bird strike will result in damage is much higher in en-route situations, while local bird strikes -due to the critical flightphase- have a higher chance to evolve into a major accident. Other examples are the difference in consequences of bird strikes with different types of aircraft; or the influence of the type of operation on the chance of encountering a bird (ref.1).

This means that in any analysis of bird strike data the proper set of data has to be selected. As a consequence, the number of available data often turns out to be insufficient for statistical sound conclusions.

By combining bird strike data from several Forces the problem of limited numbers can be eliminated.

Within the Air Forces Flight Safety Committee (Europe) (AFFSC(E)) it was decided to engage the RNLAf to undertake a pilotstudy on the feasibility of a joined European Military Bird Strike Database using the 1988 data from a limited number of Forces. The results of this study were presented during the 20th BSCE meeting in Helsinki (ref.2). Despite the limited material it proved possible to extract new information from the database and to acquire better understanding into the bird strike problem.

A further conclusion was that standardization should not be considered impossible and would substantially improve the potential value of the database. A relatively slight improvement in reporting should be sufficient. It was stated that the way to realise this objective would be the adoption of a standardised Report Form. In order to obtain full cooperation from pilots in the proper and full reporting of all bird strikes, the concept of such a 'European Military Bird Strike Form' should be such that it is straight forward and easy to fill in. Furthermore, the Form should be organised in such a way that feeding the data in a computerfile leaves no opportunity for misinterpretation.

This paper deals with the progress made in the development and introduction of the 'European Military Bird Strike Form' and accompanying computerprogram. Also an inventory is given of contributions received so far.



## 2. THE EUROPEAN MILITARY BIRD STRIKE FORM

Before designing a Form, considerations have to be made as to what kind of information is to be collected. In other words, the structure of the database has to be defined. In the course of the pilotstudy it became clear that different Forces have different approaches to the problem of gathering information on birdstrikes. Combining the best ideas from all contributors was the obvious approach.

Once the items on which information is to be collected are established, decisions had to be made concerning the way in which this information should be expressed: the conventions used for the contents of the database had to be defined.

Both **structure** and **conventions** of the database together formed the starting point in the development of the Form.

Handling the 1988 data in the pilot study learned that that most of the contributors report in their native language. This proved to be a complicating factor. We therefore took as a further criterium that the Form should be bilingual.

Finally we considered that a distinction can be made between those items which together form the **main** contribution and those items that contain **additional**, country specific information. The Form therefore had to consist of two parts. The front side containing the essential information, additional information was concentrated on the back side of the Form.

A draft Form was presented at the 109th AFFSC(E) meeting (4-7 september 1990, London). It was decided that the Form need not to be bilingual and that **english** should be language used on the Form. Details on the contents of the Form were left for discussion within the BSCE Working Group 'Bird Hazards at Low Level' which was considered to act as a specialist group for AFFSC(E). This group meticulously examined the draft Form during their 6th meeting in The Hague (21-23 November 1990). Agreement was reached on both the contents and lay-out of the Form.

Recognising the importance of standardization with respect to a joined European Database of Military Bird Strikes, the Military Agency for Standardization - Flight Safety working party (MAS/FS) on 31 januari 1991 decided to add the new standardized European Military Bird Strike Form as an annex to STANAG 3879FS.

A copy of the final version of the Form is given in appendix A.

## 3. THE TRANSFORMATION OF DATA FROM THE FORM INTO A COMPUTERFILE.

### 3.1. General concept.

Experience in analyses of the small, but very detailed RNLAf database was very helpful in the considerations on how to realise computerised data handling. So, by taking into account the ultimate goal of extracting usefull information, the development of the database structure was realised simultaneously with the development of the Form.

The main problem in setting up a database is the contradictional fact that on the one hand there is a tendency to collect as much information as possible and leave a maximum degree of freedom in the description of the bird strike and the circumstances



under which it happened. On the other hand one does not want to strain the reporting system by asking too much. Furthermore, computerised data handling requires a very disciplined, persistent and consequent attitude towards the data. In fact, an optimum had to be found between a descriptive narrative and a keyword approach. The Form leaves both options open; the tick-boxes narrow down the information to a limited number of entries while at the same time pilot remarks and comments can be entered as a narrative.

Different kinds of use of the database may each time require a different approach and specific software. To circumvent the inevitable compatibility problems, DBase 3+ is used as the format for data storage. In this widespread database handling package data is stored in an easy recognisable way, it also enables interactive manipulation of data. Last but not least, most other software packages do have import facilities for DBase format.

The Form purposeful offers the possibility to add pilot remarks and comments. For practical reasons these are stored in a separate datafile which is linked to the main file by the administration number. This means that a database for a specific Force and/or year does consist of two datafiles.

The program which facilitates computerised handling of the information from the Form should meet a minimum number of requirements. For several reasons we have decided not to use a DBase-application program. An executable file (.EXE) written in PASCAL offers a number of advantages such as speed and user-friendliness.

### 3.2. Structure and conventions used in the database.

Annex B describes in detail the structure and conventions used in the database. Conscientious comparison of the structure with the Form shows that the structure contains two fields that are not present on the Form. These auxiliary fields will be completed by the custodian of the database. They are meant to offer quick selection arguments that are frequently used in the analysis of bird strike data. The first of these fields is ACTYPE and should contain information on the aircraft category. The second auxiliary field (LOCENR) will contain information whether a bird strike occurred en-route or not.

### 3.3. User aspects of the program.

This paper is not intended as a manual for the program. For details the users guide and manual has to be consulted. Here, only the main properties of the program are briefly discussed.

The general philosophy behind the set-up of the program is that it should be very user-friendly and that entries in the database should be limited to the conventions described in appendix B as far as possible.

The program is menu driven, it offers a limited number of options which are shown in the main menu.

There are a number of default settings which are used by the program (e.g. path and filename). The definition of these settings is one of the options the main menu offers. Other options include adding data, editing or deleting data and printing data. Please notice that the program does only offer the tools to these basis operations. Special



features needed when analysing data are not provided. The DBase format of the files enables interactive manipulation by DBase or easy import in any other software package.

The program defines several windows on the screen, these windows have separate functions and are consequently shown in the same colour. Since the full presentation of a record takes more space than is available on one screen the contents of a record is divided over 6 'pages' which coincide with recognisable parts of the Form. Apart from the main window, a status window is given in the left bottom corner and a window containing limited help is projected in the lower right hand corner of the screen (figure 1). The numbering of the various fields that are presented on the screen corresponds with the numbering on the European Military Bird Strike Form.

page 1

01. Adm.number:	RNLAF/TW9103	10. Flightphase:	LLE.
02. Incident date (DDMMYY):	260691		26 june 1991
03. Incident time:	12.15Z		
04. Unit/Squadron:	313		
05. Aircraft:	F-16		
06. Speed (kts):	400		
07. Altitude (ft):	2000		
08. Lat. Long. Coörd:	49.35N-10.20E		
09. Geogr. Location:	20 NM EAST GIEBELSTAD		

Mode: Edit data Path: E:\EURPROG\EURDATA\ File: VA91.DBF	e.g.: 05.30Z (Incident time, zulu) 15.00L-16.30 (Local time of mission)
----------------------------------------------------------------	----------------------------------------------------------------------------

Figure 1. General outline of the EURBIRD screen, showing several windows.

Throughout the program it is possible to ask for an extended help window by entering a < ? > in the first position of the field for which help is needed (figure 2).

Option windows are used for a number of fields to show the only admitted entries (figure 3). Some entries in the settings mode can be picked from a scroll window by putting the cursor-bar at the appropriate place using the arrow keys (figure 4). this

During the 7th meeting of the working group 'Bird Hazards at Low-Level' (Traben-Trarbach, 9-11 september 1991) a first outline of the program was presented. The positive reactions with respect to this incomplete and imperfect first attempt were very encouraging and convinced us to go on along the taken course.



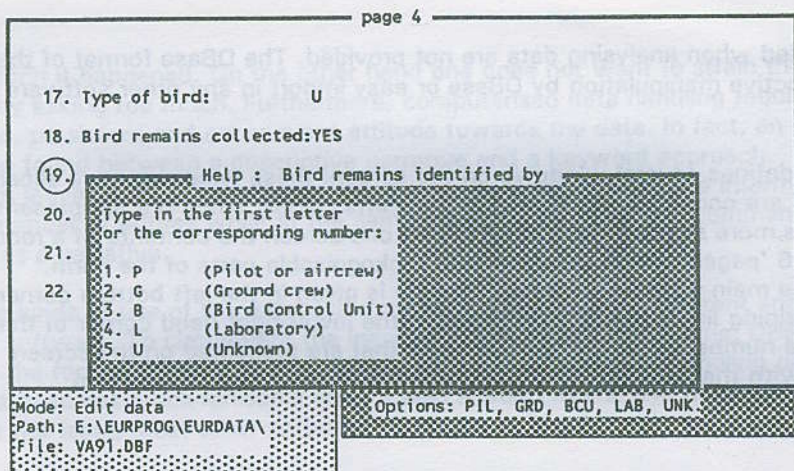


Figure 2. EURBIRD screen showing extended HELP function

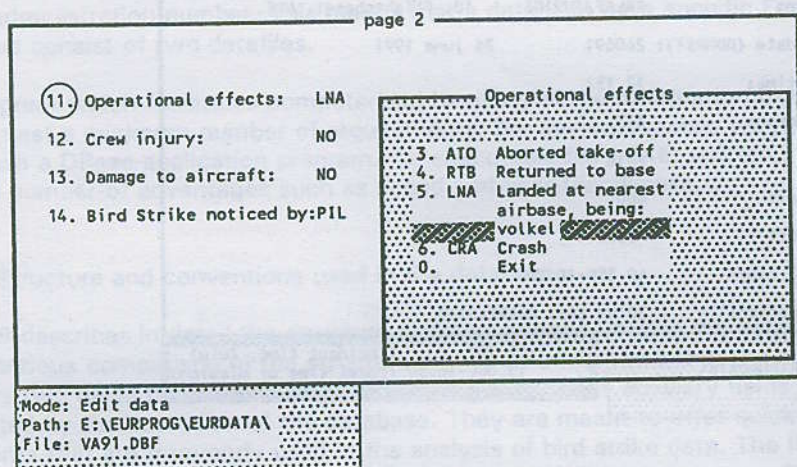


Figure 3. EURBIRD screen, showing an option window.

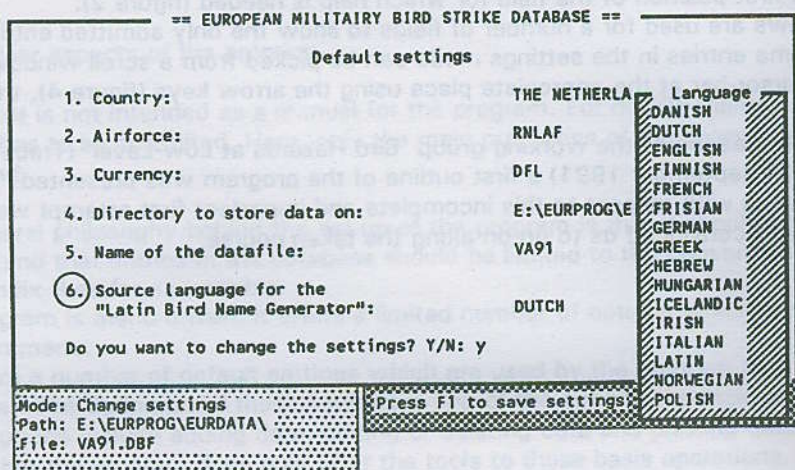


Figure 4. EURBIRD screen, showing the settings of default options.



### 3.4. The Latin Bird Name Generator

Entries in the field 'birdspecies' can be made in two ways. It is possible to use the 40 positions in this field for text that indicates the bird species involved. In fact, any text in any language is accepted. Entries of bird names in a range of different languages do limit the successful use of the database, therefore the use of the scientific Latin names should be promoted. To facilitate this, the program contains a 'Latin Bird Name Generator' which can be used when the bird involved is identified to the species level.

The Latin Bird Name Generator offers the possibility to use a scroll screen that shows - in alphabetical order- the bird names in a specified source language, next to these the appropriate Latin bird names are shown. By using PgUp/PgDn or Home/End and the arrow keys, a birdname can be selected. Pressing <ENTER> then activates the program and the Latin bird name is stored in the field birdspecies.

The Latin Bird Name Generator is also activated if the bird name is entered in the language which was specified in the settings. The program checks whether it 'knows' this specific bird species. If so, the latin name will be shown and stored in the data file. If the entered text in the field 'bird species' is not recognised by the program as a bird name this text will be stored unchanged. This leaves the opportunity to enter any text in any language as a last option.

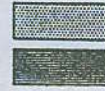
The information used by the Latin Bird Name generator is stored in the database BIRDS.DBF (in the program directory). The program and the database BIRDS.DBF can potentially serve 19 source languages, 17 of which are implemented. Due to problems with the Greek symbol set bird names in Greek are not (yet) available. Irish names are known to be published but not yet retrieved. For most of the 17 other languages the majority of the bird names are available. Scandinavian bird names were provided by P.G. Bentz, bird names in other languages are mainly taken from H.I. Jorgensen (ref.3). Despite serious attempts to provide the Latin Bird Name Generator with correct and complete information, some names are missing and some are bound to be incorrect. In order to improve both the quality and the quantity of available bird names, completions and corrections are most welcome.

## 4. CONTRIBUTIONS TO THE DATABASE.

Since the analysis of 1988 bird strike data was presented (ref.2), the number of Forces of which data was received increased from five to twelve. All the contributions consisted of extractions of existing databases or incorporation in existing reporting systems. Merging all data into one European database thus means conversion of a multitude of data types into the agreed structure. An extra complicating factor is the fact that most contributions are not yet available as a computer file but only in a printed form. We are now in the process of transforming all existing data -as far as possible- to the new structure.

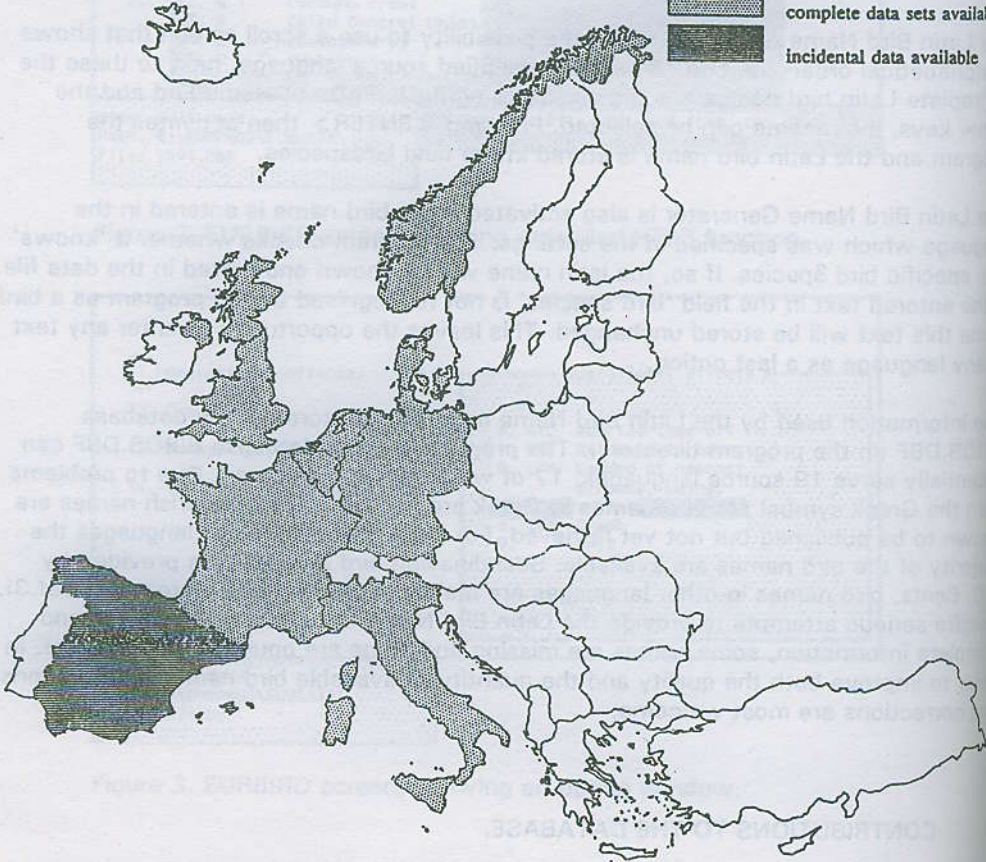
In figure 5 all the countries from which data are received are indicated. Details on the years for which data are available and the way in which the data is contributed are listed in appendix C.

**Nations contributing to the European Military Bird Strike Database**



complete data sets available

incidental data available





As is clear from annex C, most AFFSC(E) members now are contributing to the database. Apart from those of SHAPE, bird strike data are received on a regular basis from 9 countries. No data have yet been received from TuAF, HAF, and PoAF; while contributions from USAF(E) and SAF did only have an incidental character.

The acceptance of the project of the European Military Bird Strike Database by AFFSC(E) members has been extremely important. It meant that the project could start with a fair number of contributors. Taken into account that flight safety is important to all Forces, extension of the circle of contributors with Air Forces not joining AFFSC(E) has to be considered. Recent political changes certainly make the participation of all European countries in the joined database seem a realistic option.

Hopefully, the availability of the new Form and the computerprogram as such will not only affect standardization of the contributing Forces but also of others, and thereby will enforce the comparability of bird strike statistics.

5. REFERENCES

1. Buurma, L.S. (1984); Key factors determining bird strikes and risks. Int. J. of Aviation Safety, Vol.2,no.1, pp. 91-107.
2. Dekker, A. & L.S. Buurma (1990); Towards a European Database of Military Bird Strikes. 20th Meeting Bird Strike Committee Europe, Working Paper 14. Helsinki
3. Jorgensen, H.I. (1958); Nomina Avium Europaeorum. Copenhagen



# EUROPEAN MILITARY BIRD STRIKE FORM

01. Adm. number .....  
 02. Incident date .....  
 03. Incident time .....  
 04. Unit/Squadron .....  
 05. Aircraft type .....  
 06. Speed .....  
 07. Altitude .....  
 08. Lat. Long. Coörd .....  
 09. Geogr. Location .....

10. Flightphase:  Taxiing  
 Take-off  
 Climb  
 Low level, En-route  
 Cruise  
 Holding, in circuit  
 Descent  
 Final Approach  
 Landing  
 Touch and go, Overs  
 Unknown

11. Operational effects:  Unknown  No  Yes.....  Aborted take-off  
 Returned to base  
 Landed at nearest airbase, being:

12. Crew injury:  Unknown  No  Yes  
 13. Damage to aircraft:  Unknown  No  Yes  
 14. Bird Strike noticed by:  Unknown  Pilot  Groundcrew

	15. Impactpoint	16. Damagepoint		15. Impactpoint	16. Damagepoint
Radome	<input type="checkbox"/>	<input type="checkbox"/>	Canopy/windscreen	<input type="checkbox"/>	<input type="checkbox"/>
Nose	<input type="checkbox"/>	<input type="checkbox"/>	Fuselage	<input type="checkbox"/>	<input type="checkbox"/>
Wing	<input type="checkbox"/>	<input type="checkbox"/>	Landing gear	<input type="checkbox"/>	<input type="checkbox"/>
Rotor	<input type="checkbox"/>	<input type="checkbox"/>	Empenage	<input type="checkbox"/>	<input type="checkbox"/>
Air intake	<input type="checkbox"/>	<input type="checkbox"/>	Underwing Stores	<input type="checkbox"/>	<input type="checkbox"/>
Powerplant/Engine	<input type="checkbox"/>	<input type="checkbox"/>	Unknown	<input type="checkbox"/>	<input type="checkbox"/>

17. Type of bird  Small (sparrow size)  Medium (pigeon size)  Large (duck size)

18. Bird remains collected  Unknown  No  Yes

19. Bird identified by  Unknown  Pilot  Gr.crew  BCU  Laboratory

20. Bird species: .....

21. Bird Number  Unknown  Single  Flock, (number: )

22. Pilots remarks:



## ADDITIONAL INFORMATION

23. Pilots name .....
24. Pilots reg. number .....
25. Aircraft reg. number .....
26. Engine reg. number .....
27. Costs ..... Including manhours?  Yes  No  Unknown
28. Man hours spent in repair .....
29. Classification (if applicable) .....
- 
30. A/C Lights  Unknown  Off  On
31. On board radar  Unknown  Off  On
32. BIRD TAM  Unknown  No  Yes, namely.....
33. Light conditions  Unknown  Dawn  Day  Dusk  Night
34. Conditions  IMC  VMC  Snow  Rain  Clouds...../8  Visibility .....Km
- 

35. Comments:



## Structure and conventions of the European Military Bird Strike Database

- ADMNUMBER, 15 pos.** First 5 positions reserved for abbreviation of air force. If less than 5 positions hyphens up to the sixth position.  
Abbreviations:
- |                |      |                     |       |
|----------------|------|---------------------|-------|
| Belgium        | BAF  | Canada in Europe    | CFE   |
| Denmark        | RDAF | Germany             | GAF   |
| France         | FAF  | Greece              | HAF   |
| United Kingdom | RAF  | Netherlands         | RNLAF |
| Italy          | IAF  | Norway              | RNOAF |
| Portugal       | POAF | Spain               | SAF   |
| Turkey         | TAF  | US Air Force Europe | USAFE |
- NATO-Shape SHAPE
- It is possible to enter a specific country code as default-setting (option 4 in Main Menu). Airforce and adm. number are separated by a '/' at the sixth position.
- INCDATE, 8 pos.** Date in European notation, DD/MM/YY.  
Default setting: systemdate
- INCTIME, 12 pos.** Time of birdstrike.  
Hours to be separated from minutes by <.> to be followed by letter indicating timezone.  
If incident time is unknown both begin and endtime of the mission can be filled in (separated by a <->).
- UNITSQR, 15 pos.** Unit or squadron the aircraft belongs to
- AIRCRAFT, 15 pos.** Type of aircraft
- ACTYPE, 3 pos.** Not to be entered by the user but to be fed in the database afterwards by the custodian. This field enables grouping of the data according to type of aircraft. The following types are recognised:
- |     |                            |
|-----|----------------------------|
| HEL | Helicopters                |
| JET | Jet fighters/bombers       |
| TPC | (Turbo) Propellor Carriers |
| JEC | Jet Engine Carriers        |
| OTH | Other                      |
- SPEED, 3 pos.** Speed in knots, unknown to be entered as 'UNK'.
- ALTITUDE, 5 pos.** Altitude in Ft., unknown entered to be as 'UNK'.

LATLONG, 14 pos

Geographical coördinates, Degrees to be seperated from minutes by a dot. First latitude, followed by a letter (N or S); immidiately followed by longitude plus letter (E or W). The pair of coördinates is written in the file seperated by <->.

LOCATION, 40 pos. Description of location.

FLPHASE, 11 pos.

Flightphase. A maximum of three codes to be filled in, seperated by dots. Abbreviations:

Taxying	TAX
Take-off	TOF
Climb	CLI
Low level, En-route	LLE
Cruise	CRU
Holding, in circuit	HOL
Descent	DES
Final Approach	FAP
Landing	LAN
Touch and Go, Overshoot	TGO
Unknown	UNK

LOCENR, 3 POS.

Field to be filled in afterwards in order to facilitate quick selecting. Classification possible of bird strikes into:

LOC	Local / on airfield
ENR	En-route
UNK	Unknown

OPEFFECTS, 3 pos. Only 6 abbreviations are allowed in the program:

UNK	Unknown
NO	No
ATO	Aborted take-off
RTB	Returned to base
LNA	Landed at nearest airbase
CRA	Crash

BASE, 15 pos.

Only to be filled in if 'LNA' in 'opeffects', for any other operational effects the program keeps this field empty.

INJURY, 3 pos.

Only YES, NO or UNKnown to be filled in. Default setting: NO

DAMAGE, 3 pos.

Only YES, NO or UNKnown to be filled in. If no damage, the fields COSTS, MANHOURSIN and MANHOURS are set empty.



- NOTICED, 3 pos.** Only three possibilities:  
 UNK Unknown  
 PIL Pilot  
 GRD Groundcrew
- IMPACTPNT, 15 pos.** Up to 4 threeletter codes (seperated by dots) can be filled in to indicate the impactpoint. Abbreviations used are:  
 RAD Radome NOS Nose  
 WIN Wing ROT Rotor  
 AIT Air Intake POW Powerplant / Engine  
 CAN Canopy / FUS Fuselage  
 Windscreen LAN Landing gear  
 EMP Empenage UST Underwing  
 UNK Unknown Stores / Tanks
- DAMAGEPNT, 15 pos.** As Impactpnt
- TYPEBIRD, 1 pos.** Indication on the type of bird involved, four entries possible:  
 S Small, sparrow size  
 M Medium, pigeon size  
 L Large, duck size  
 U Unknown
- BIRDREMAIN, 3 pos.** Contains information on birdremains, i.e if remains were collected and who identified them. Only the following abbreviations:  
 UNK Unknown wether birdremains were collected  
 NO No birdremains collected  
 YES Birdremains were collected
- BIRDIDENT, 3 pos.** Contains information who identified the bird species involved.  
 UNK Unknow BCU Bird Control Unit  
 PIL Pilot LAB Laboratory  
 GRD Groundcrew
- If no birdspecies is identified this field is normally to be left empty. It is however, possible that birdremains were collected and professional identification failse.
- BIRDSPEC, 40 pos.** Bird species, any text is allowed but preferably the Latin Bird Name Generator (see 5.2) is to be used.
- BIRDNR, 3 pos.** Opportunity to indicate number of birds that were involved.  
 UNK Unknow  
 SIN Single bird  
 FLO Flock  
 999 Number





**LIGHTCOND, 3 pos.** Information on the light conditions at the time of bird strike. The following entries are possible:

UNK	Unknown	DWN	Dawn
DAY	Day	DSK	Dusk
NGT	Night		

**CONDITIONS, 8 pos.**

Meteorological information. At each specific position a digit can be entered indicating certain conditions.

First position values	: U	Unknown
	I	IMC conditions
	V	VMC conditions
Second position values	: U	Unknown
	S	Snow
	-	No snow
Third position values	: U	Unknown
	R	Rain
	-	No rain
Fourth position		: Separating dot
Fifth position values		: Cloud coverage in 1 to 8
		Blank = no information
Sixth position		: Separating dot
Last two positions		: Visibility in Km.
		Blank = no information
		More than 10 Km = 10

Structure of the accompanying remarksfile

**ADMINNR, 15 pos.**

**LINENUMBER, 2 pos.**

**PILOTTEXT, 70 pos.**

## Appendix C

Airforce	1988		1989		1990		1991	
RAF	C	694	A-from aug. C	640	A E		A E	
GAF <sup>1</sup>	C	597	C D	623	E		E	
RDAF	B	38	B	45	B	66	B	51
FAF			C	80 jan/apr + oct/dec	C	91		
SAF			B	19 from 23 june	B	12	B	4
IAF					A	45 from april	A	87
CFE			C	71	C	50	C	6 incompl.
USAFE	D	243						
RNLAF	D	195	D	243	D	183	D	89
BAF	C	116	C	116	C	95		
SHAPE <sup>2</sup>			C	21	C	24		
RNOAF <sup>3</sup>	D	38	D	38	D	36	D	8 incompl.

Table 1: A = Reporting has been incorporated in standard reporting system  
 B = Copies of BS forms are sent in (batchwise)  
 C = Computeroutput on paper or tables  
 D = Computerfiles on floppy disks available  
 E = Computerfiles on floppy disks imminent

<sup>1</sup> Computerfile for the years 1979-1989 (5781 records) available.

<sup>2</sup> For the years 1989 and 1990 tables available with (limited) data per bird strike, furthermore summary tables for the years 1983 - 1990 were received.

<sup>3</sup> MacIntosh datafile available for the years 1985 up to may 1991. Total 191 bird strikes, of which 19 NON-RNOAF strikes