Institut National des Sciences de l'Univers Université Louis Pasteur

Centre de Données astronomiques de Strasbourg (CDS)

Observatoire Astronomique de Strasbourg

11 rue de l'Université, F-67000 Strasbourg, France

SIMBAD

User's Guide

&

Reference Manual

SIMBAD III – Release 1.2 – April 1992

Table of Contents

1 Short SIMBAD Help 3

2 Introduction 7

I FIRST STEPS 11

3 Access to SIMBAD 13

4 First session 16

II USER'S GUIDE 21

5 How to retrieve information for one object ? 23

6 Accessing by coordinates 32

7 How to create a list of objects: the filter 36

8 Querying from a list 40

9 Using SIMBAD in batch mode 43

10 Keeping a log of your session 47

11 SIMBAD Help 48

12 How to leave SIMBAD 50

III MORE ABOUT SIMBAD FEATURES 51

13 Simple SIMBAD concepts 53

14 The Contents of SIMBAD 56

15 Managing an astronomical object 63

16 Sampling and defining filters 65

17 Managing an Object list 71

18 Defining formats 73
19 Environment variables 83
20 The session 85
21 Managing the user interface 86
22 The user Agent 88
23 The internal Mail facility 90
24 Macro language 91
25 Using the text editor 94

IV REFERENCE MANUAL 99
26 Agents and command table 101
27 Default formats 107
28 Special commands 115

V Appendices 117
A Greek letters coding 119
B Constellation names 120
C Clusters and Cluster stars 121
D Spectral types coding 123
E Morphological types coding 125
F Description of measurement types 126
G Journals scanned for the bibliography 140
H From SIMBAD II to SIMBAD III 143

INDEX 145

Chapter 1

Short SIMBAD Help

The present chapter is a short summary of the main SIMBAD commands.

1.1 To search by astronomical object (chapter 5)

At the '`simbad search ->`' prompt, type the astronomical object *identifier*, for example:

`simbad search -> HD 124897`

You will first receive the basic data and identifiers for the object. You can then type one of the following keywords:

`[identifier] display ->`	`[CR]`	all data
	basic	basic data
	id	identifiers
	data	all measurements
	cat	measurements from catalogue *cat*
	bib	bibliographical references
	bye	leaves the current object

The following parameters can be set:

bibyears *low/high*	limits bibliography by years (4 digits)
equi1 *yyyy*	sets first equinox (e.g. `1950`)
equi2 *yyyy*	sets second equinox of displayed coordinates

Example: `bibyears 1988/1992`

Important: Note that keywords (like `bibyears` or `equi1`) should be typed in *lower-case* letters.

1.2 To search by coordinates (chapter 6)

Enter the R.A. and Dec. you wish to search (not forgetting the + or − of the declination) in the following way: `HH MM +DD MM` ... Example:
`simbad search ->` `01 23 +45 56`

The following parameters can be set:

cooradius *dd mm*	changes the radius; default: 0°10'
cooequinox *year.d*	set equinox of input coordinates; default: 1950.0

The result is a list of objects which can be displayed as follows:

`simbad-list1 display ->`	**all**	all objects
	+n	n objects from the current one
	n	object # n
	bye	leaves the current object

1.3 To search by filter (chapter 7)

First, choose a name for the filter, and assign it by typing:
`simbad search ->` **session use filter** *filtername*
You will receive the following prompt:
`filter set ->`
here, type [CR], then **i** *for input mode, then enter the text of the filter:*

Example of filter :
```
FIELD 10 00 -12 00 DIM 2/2
MB 6.5/9.0
CAT SAO
```

type [esc] then **:wq** *for leaving the editor*
`filter set ->` **bye**
for processing the filter, type the filter name preceded by a quote:
`simbad search ->'`*filtername*

1.4 To search from lists (chapter 8)

First, select the data to be collected by typing:

basicdata	coord, mag, sp. type and p.m. (default value)
bibliography	only references codes
maxdata	all available data

Then, use lists of identifiers or coordinates contained in (separate) specific files:

`simbad search ->`	**idlist** *filename*	for identifier list
	coolist *filename*	for coordinates list

Bibliographical references may be displayed once at the end of a session, using the command:

reftext

1.5 Output control and Log file (chapter 10)

log	keeps a log of the session in a file 'simbad.log'
sendlog *user@node.domain*	sends the log file through e-mail (Internet)
sendlog *user@node.bitnet*	(EARN/Bitnet)
sendlog *node::user*	(or SPAN)

cont	for continuous display mode
page	to restore page by page mode

undisplayed	to stop screen display
displayed	to restore screen display

1.6 To create a format (chapter 18)

`simbad search ->` **/session use format** *formatname*
`ff set ->`
here, type [CR], then **i** *for input mode, then enter the text of the format, e.g.:*

```
ID(20) HD|NGC|1
COO (27)
FIN
```

type [esc] then **:wq** *for leaving the editor*
`ff set ->` **bye**
`simbad search ->` **/env set FM-IMMEDIATE**=*formatname*

1.7 Help (chapter 11)

At any prompt, you can obtain a context-sensitive help by typing:

?

Details about catalogue names can be obtained from the **info** command:

info -help	lists the main functions of the command
info cati AB	lists catalogues with acronyms starting with `AB`
info cato X	lists catalogues dealing with X-ray sources (object type)
info cata *Author*	lists catalogues with first author named *Author*
info cat *keyword*	lists catalogues according to presence of specified word in title or remarks

1.8 Leaving SIMBAD

At any prompt, type:

session exit *or* **stop**

If the Simbad database was helpful for your research work, the following acknowledgment would be appreciated:
This research has made use of the Simbad database, operated at CDS, Strasbourg, France
We would also appreciate receiving a preprint or reprint of the relevant papers, at the following address:
CDS, Observatoire de Strasbourg
11, rue de l'Université
67000 STRASBOURG, France

Inquiries, requests, and comments can be addressed by electronic mail to:
Internet: question@simbad.u-strasbg.fr
SPAN: SIMBAD::QUESTION

Chapter 2

Introduction

The present User's guide describes the new *SIMBAD III* software which was first released on July, 1st 1990.

The authors of the SIMBAD software are Marc Wenger, François Bonnarel, and Soizick Lesteven (CDS, Strasbourg).

The updating of SIMBAD is a continuous daily process performed through a collaboration with the following contributing institutes:

bibliography: Institut d'Astrophysique de Paris, Observatoire de Paris and Observatoire de Bordeaux

photometry: Observatoire de Genève and Institut d'Astronomie de Lausanne;

astrometry: Astronomisches Rechen Institut, Heidelberg;

galaxies: Observatoire de Lyon and NASA/IPAC Extragalactic Database.

This User's Guide has been prepared by Daniel Egret (CDS, Strasbourg) from contributions by Marc Wenger (CDS, Strasbourg), Joyce M. Watson (SAO, Cambridge), François Ochsenbein (CDS), and François Bonnarel (CDS).

SIMBAD

SIMBAD is the acronym for:

	Set
of	**I**dentifications,
	Measurements
and	**B**ibliography
for	**A**stronomical
	Data.

Centre de Données Astronomiques de Strasbourg (CDS)

The CDS is located at the Observatoire Astronomique de Strasbourg (France). CDS is operated under an agreement between French Institut National des Sciences de l'Univers (INSU) and Université Louis Pasteur, Strasbourg (ULP). CDS personnel created and implemented the SIMBAD data bank and maintain its data and software system.

SIMBAD was created by merging the Catalog of Stellar Identifications (CSI) and the Bibliographic Star Index (see References) as they existed at the Meudon Computer Centre until 1979. The resulting data base was then expanded by the addition of source data from the many catalogs connected to the CSI and by new literature references. The database was extended to galaxies and other non-stellar objects in 1983.

The first on-line interactive version of SIMBAD was released in 1981, at the Centre de Calcul de Strasbourg-Cronenbourg (CCSC) and operated there until December 1984, when it was moved to the Paris-Sud informatique (PSI) Univac 1190 computer at Orsay, France and operated there until June 30, 1990. In this document, SIMBAD II refers to the software which has been running until June 1990 on a Univac computer. SIMBAD III is the present version of the software.

Simbad database is now hosted on a DECsystem 5400 running Ultrix (the DEC's version of Unix), at the Strasbourg Observatory. Connections are available through public data transmission networks (namely: TRANSPAC in France, DATEX-P in Germany, TELENET in the U.S., etc.) and through INTERNET (TCP/IP) and SPAN (DECNET) networks.

The database management system of SIMBAD has been developed by the CDS, using the concepts of object-oriented programming. The term *Simbad* in this User's Guide will refer both to the data base itself and to the software system used.

SIMBAD III

Simbad features can be summarized by:

- A language based on the concept of agents (using the concepts of object-orientation).
- Database queries can be made through:
  1. identifiers (names of astronomical objects),
  2. sets of coordinates (retrieving all objects in a given direction) and
  3. sampling criteria (or *filters*).
- Output of data is driven by formats. The user may write his own formats or modify existing ones. Output files can be mailed to the user.

- The user interface is adaptable to user preferences: line by line on simple terminals, or with full screen management on more sophisticated terminals. In the present version of the user's guide, we will mainly describe the command mode (line by line). The full screen mode will be developed and described in next versions of this document.
- An online hierarchical help system, with context sensitivity.

Contents of the data base

The SIMBAD data base presently contains information for:

- about 650,000 stars;
- about 100,000 nonstellar objects (galaxies, planetary nebulae, clusters, novae and supernovae, etc.).

The only astronomical objects specifically excluded from SIMBAD are Solar System bodies.

For each object, the following data are included (see chapter 14):

- basic data:

  stars : coordinates, spectral type, blue and visual magnitudes, and proper motion;

  galaxies : coordinates, blue and visual integrated magnitudes, morphological type, and dimension;

- cross identifications of stars and galaxies from more than 400 source catalogues, either completely or partially included in the data base. A list of the catalogues used is available as a separate document (*Catalogue Acronyms and Abbreviations in SIMBAD*).
- observational data (also called *measurements*), for more than twenty different data types. A list of these types is given in the Appendix.
- general bibliography for the object, including references to all published papers from the journals regularly scanned (currently about 85 titles). Articles are scanned in their entirety, and references to all objects mentioned are included in the bibliography.

  The updating of SIMBAD is a continuous daily process performed through a collaboration with the Institut d'Astrophysique de Paris and the Paris and Bordeaux observatories. It is therefore highly probable that the references are completely up to date.

This SIMBAD manual

Part I tells you how to access to SIMBAD and presents a first session, as example.

Part II (chapters 5 to 12) is a short User's Guide containing all you need to know for a simple use of SIMBAD.

Part III (chapters 13 to 25) presents more advanced features and lists all the commands related to SIMBAD agents (including filter, format, and environment variables).

Part IV (chapters 26 to 28) is a short Reference Manual.

Finally, the last part gives some additional useful tables.

In the text, commands you have to type as such are printed in **bold face**, while parameters or names you have to replace by your own choice are typed in *bold italic*. Prompts or data coming from Simbad are usually given in `tty` font.

Comments and suggestions are welcome concerning the software or this User's Guide (for instance by sending messages to the following e-mail address: `question@simbad.u-strasbg.fr` or `SIMBAD::question`).

References

1. Ochsenbein, F., Bischoff, M., and Egret, D., *Microfiche edition of CSI (Catalog of Stellar Identifications)*, 1981, Astron. Astrophys. Suppl. **43**, 259-261.

2. Ochsenbein, F., *The Bibliographical Star Index*, in *Automated Data Retrieval in Astronomy*, ed. C. Jaschek and W. D. Heintz, I.A.U. Colloquium **64**, 1981, Dordrecht, D. Reidel Publishing Company, 1982, p. 171-173.

3. Heck, A., and Egret, D., *SIMBAD, the CDS Database*, 1987, *The Messenger/ El Mensajero*, (ESO), 1987, **48**, p.22-24.

4. Egret, D., Wenger, M. & Dubois, P., *The SIMBAD astronomical database*, 1991, in *Databases and On–line Data in Astronomy*, M.A. Albrecht & D. Egret (eds.), Kluwer Academic Publishers, p. 79-88.

5. Various articles that have appeared in *CDS Information Bulletin* in recent years.

Part I

FIRST STEPS

Chapter 3

Access to SIMBAD

For accessing *Simbad* you should use a terminal or a micro–computer connected either to a national public data transmission (X.25) network or to SPAN or Internet. A standard solution is to use a VT100-type terminal.

3.1 SIMBAD access request

Potential users must apply for database access by contacting the CDS Director (see section 3.4). The following essential elements will be issued to applicants:

1. a personal Userid and Password (for access to the SIMBAD host)
2. additional passwords (when needed, for SIMBAD gateways)
3. a copy of the *User's Guide* (the present document).

The user can change his (her) password by invoking the command **password** within Simbad.

The applicant must also obtain access to an appropriate computer network for connection to the SIMBAD host (please check with your computer manager). SIMBAD is currently accessible through INTERNET (TCP/IP), SPAN (DECNET) and X25 public networks. Electronic Mail networks (such as BITNET) which do not allow remote log-in are NOT suitable for interactive access to SIMBAD (but can be used for batch mode queries, see chapter 9).

From any place in the world it is always possible to connect reliably to SIMBAD, by using the public X25 networks in order to reach TRANSPAC (French packet switched data network) either directly or through a user's international network, such as: `NPSS/IPSS` for the United Kingdom, or `DATEX-P` for the German Federal Republic.

In Europe a gateway to SIMBAD is available through the *European Space Information System* (ESIS) of the European Space Agency at ESRIN, Frascati, Italy. A gateway to

SIMBAD, funded by NASA, is available at SAO (Cambridge, U.S.A.). U.S. users should consult connection instructions distributed to them by the U.S. agent (see addresses, below).

3.2 Access to the database server

Access through INTERNET is given by:

telnet simbad.u-strasbg.fr or **telnet 130.79.128.4**

Access through SPAN, from any SPAN node running VMS, is given directly by:

set host simbad or **set host 29588**

In the *Unix* world, the SIMBAD node is also known as **28.916**.

Access through TRANSPAC and national public (X.25) networks is available by entering the following number:

020806700091733	from outside France
16700091733	from France

This number gives access to the SIMBAD database server (a DECserver 5400 running Ultrix) through a front-end computer (a MicroVax II) provided to the CDS by the ESIS project of the European Space Agency (ESRIN, Frascati, Italy).

SIMBAD may also be accessed, in France, through TELETEL: dial **36 21** and then type the TRANSPAC number given above.

The information given in the present section is subject to modification: please use the contact addresses given below for up-to-date information.

3.3 Access to the database services

On the prompt "login:", type:

`login:` *your username*

`Password:` *your password*

this will give you direct access to the SIMBAD application.

Please note that these entries are case-sensitive, and that the userid is usually in *lower-case* letters. The password can be changed at any time by typing **password**. For security reasons it is important to avoid names, first names, and in general any word coming from a dictionary.

3.4 Contacts for Inquiries

All kinds of inquiries, requests for help and comments can be addressed by electronic mail to:

Internet: **question@simbad.u-strasbg.fr**
SPAN: **SIMBAD::QUESTION**

or by phone (office hours, European time) to:

Tel: **+33 88 35 84 11**

Other points of contact are:

The Director of the CDS		Dr. Michel Crézé CDS, Observatoire Astronomique 11, rue de l'Université 67000 Strasbourg France
	Tel:	+33 88 35 82 18
	Telex:	890506 STAROBS
	Fax:	+33 88 25 01 60
	SPAN:	SIMBAD::CREZE
	Internet:	creze@simbad.u-strasbg.fr
U.S. Users (all problems and questions)		Joyce M. Watson Smithsonian Astrophysical Observatory 60 Garden Street Cambridge, MA 02138, U.S.A.
	Tel:	+1 (617) 495 7264
	Telex:	921428 SATELLITE CAM
	Fax:	+1 (617) 495 7199
	Internet:	watson@cfa.harvard.edu
	Bitnet (EARN):	WATSON@CFA
	SPAN:	CFA::JOYCEMR

Chapter 4

First session

Once you have reached SIMBAD, you get the first prompt:

```
Simbad search ->
```

This prompt must be seen as a partial command that has to be completed with parameters by the user in order to formulate a query.

The parameters can be:

- **A single identifier** to obtain the data corresponding to an astronomical object. The syntax of an identifier is detailed in chapter 5.
- **Coordinates** to get all objects within a given radius around the central position (default values: 10 arcmin. radius and equinox 1950).
- **A filter name** to make a sample. How to create a filter is explained in chapter 16. The filter name must be preceded by the character ' (quote).
- **A reference code** to get the corresponding full reference.

Example: Imagine you want to get all available data for an object. Type the object name (here: HD 9902) and push the [CR] key. You will first obtain basic data and alternate identifications (aliases) of the object.

```
Simbad search -> HD 9902

Type: star
Coord 1950.0 = 01 34 24.66  +20 26 45.8       mb, mv =  9.3        8.7
Coord 2000.0 = 01 37 08.52  +20 42 01.6    sp type = G5
          gal = 137.13 -40.91
       pm =  +0.062  [   7]   -0.038  [   9]
------------------------------------------------------------------------------
AG+20 146                BD+19 269                HD 9902
YZ 0 1190                SAO 74827                YZ 20 465
```

```
1E 0134.3+2027
--------------------------------------------------------------------------------
Measurements:
pos: 1    PM: 1     SAO: 1
--------------------------------------------------------------------------------
References: 3
--------------------------------------------------------------------------------
[HD 9902] display ->
```

You can, for instance, type one of the following keywords:

`[identifier] display ->`		
	`[CR]`	all data
	basic	basic data
	id	identifiers
	data	all measurements
	cat	measurements from catalogue *cat*
	bib	bibliographical references
	bye	leaves the current object

Example: You want to list all the information available (basic data and identifiers, observational data or measurements, and bibliographical references) for the star HD 9902. The output will be as follows:

```
[HD 9902] display -> [CR]

==== HD 9902 (star)
Coord 1950.0 = 01 34 24.66  +20 26 45.8     mb, mv =  9.3        8.7
Coord 2000.0 = 01 37 08.52  +20 42 01.6    sp type = G5
          gal = 137.13 -40.91
       pm =  +0.062  [   7]   -0.038  [   9]
--------------------------------------------------------------------------------
AG+20 146                BD+19 269                HD 9902
YZ 0 1190                SAO 74827                YZ 20 465
1E 0134.3+2027
--------------------------------------------------------------------------------

pos  |    alpha        delta    |me.al me.de|equi  epoch |     reference     |
--------------------------------------------------------------------------------
pos  |01 34 24.712 +20 26 45.43 | .20   .23 |1950 1958.68|1971$AGK3.C.......L|

PM   | pm-ra [ m.e ]| pm-de [ m.e ]|     reference     |
-----------------------------------------------------
PM   |  +.082[ .009]|  -.038[ .009]|1971$AGK3.C.......L|
```

```
Do you want to see more ?  y

SAO  |   alpha          delta    : m.e| pm-ra :m.e| pm-de :m.e|
          reference     |
-------------------------------------------------------------------------------
SAO m|01 34 24.660 +20 26 45.81  : .19|  +.062:007|  -.038:009|
      1966$SAO..C.......S|

-------------------------------------------------------------------------------

1981ApJ...245..163V: VAIANA  G.S., CASSINELLI J.P.,  FABBIANO G., GIACCONI
    R.,  GOLUB L., GORENSTEIN P., HAISCH B.M., HARNDEN F.R., JOHNSON H.M.,
    LINSKY  J.L., MAXSON C.W., MEWE R., ROSNER R., SEWARD F., TOPKA K. and
    ZWAAN C. <Astrophys. J.,245,163,1981.>
    Results from an extensive Einstein stellar survey.

1989ApJ...340.1011F: FLEMING  T.A.,  GIOIA  I.M.  and  MACCACARO  T.
    <Astrophys. J.,340,1011,1989.>
    The  relation between X-ray  emission and rotation  in late-type stars
    from the perspective of X-ray selection.

1990ApJS...72..567G: GIOIA M.,  MACCARARO  T.,  SCHILD  R.E.,  WOLTER  A.,

Do you want to see more ?  y

    STOCKE J.T.,  Morris  S.L.  and  HENRY  J.P.  <Astrophys.  J.,  Suppl.
    Ser.,72,567,1990.>
    The  Einstein  Observatory  extended  medium-sensitivity  survey.  I.
    X-ray data and analysis.

[HD 9902] display -> bye
simbad search ->
```

It happens frequently that the number of bibliographical references available for one object is quite large, so that it becomes useful to display only the references published within a given year range.

The following example shows how to display the bibliographical references published in 1990 or 1991, in which the star Arcturus is mentioned.

First note that Arcturus shall be called `NAME ARCTURUS` following the rule that an identifier should include a catalogue name (here the generic catalogue of star's names: `NAME`):

```
simbad search -> NAME ARCTURUS
```

```
Type: star
Coord 1950.0 = 14 13 22.749 +19 26 30.96       mb, mv =  1.19  V?  -0.04
Coord 2000.0 = 14 15 43.458 +19 12 36.73    sp type = K1.5III
          gal =  15.14 +69.11
       pm =  -1.098  [   1]   -1.999  [   1]
-------------------------------------------------------------------------------
HD 124897                 GEN# +1.00124897          SKY# 26028
SAO 100944                UBV M 20076               NSV 6603
HR 5340                   BD+19 2777                IRC +20270
CSV 101433                SV* ZI 1054               GC 19242
N30 3229                  LHS 48                    * alf Boo
TD1 17351                 Ci20 843                  PLX 3242
GJ 541                    * 16 Boo                  NAME ARCTURUS;
FK4 526                   GCRV 8341                 JP11 2486
ROT 2044                  UBV 12551                 LFT 1084
LTT 14184                 IRAS 14133+1925           AFGL 1693
-------------------------------------------------------------------------------
Measurements:
GEN: 1    UBV:13    V*: 1     pos: 2    GJ: 1     TD1: 1    PM: 4
MK:32     JP11: 4   UVBY: 4   PLX: 5    GCRV:41   ROT: 2    SAO: 1
-------------------------------------------------------------------------------
References: 671
-------------------------------------------------------------------------------

[NAME ARCTURUS] display -> bibyears 1990/1991

[NAME ARCTURUS] display -> bib

1990A&A...228..218D: DRAVINS D. <Astron. Astrophys.,228,218,1990.>
    Stellar granulation.  VI.  Four-component  models  and  non-solar-type
    stars.

1990A&A...231..125S:     SMITH    G.     and    DRAKE     J.J.    <Astron.
    Astrophys.,231,125,1990.>
    The wings of  the calcium  infrared triplet  lines in  late-type giant
    stars.

1990A&A...232..396B: BLACKWELL D.E., PETFORD  A.D.,  ARRIBAS  S.,  HADDOCK
    D.. and SELBY M.J. <Astron. Astrophys.,232,396,1990.>
    Determination of  temperatures and angular diameters  of 114 F-M stars
    using the infrared flux method (IRFM).

1990A&A...234..366G:    GRATTON    R.G.    and    SNEDEN    C.    <Astron.
```

```
    Astrophys.,234,366,1990.>
    The chemical composition of mu Leonis.

Do you want to see more ?  y

1990A&A...237..153P:  PERSI  P.,  FERRARI-TONIOLO  M.,  SHIVANANDAN  K.,
    RANIERI M. and MARENZI A. <Astron. Astrophys.,237,153,1990.>
    Infrared photometry up  to 34  mu.m of  the type  II OH/IR  sources OH
    127.8-0.0 and OH 345.0+15.7

1990A&A...237..237L: LEROY J.L. <Astron. Astrophys.,237,237,1990.>
    Broad-band polarization in crowded spectra.

1990AJ.....99.1961F: FERNANDEZ-VILLACANAS J.L., REGO  M.  and  CORNIDE  M.
    <Astron. J.,99,1961,1990.>
    Barium and iron abundances in red giants.

1990Ap&SS.164..263A: AVCIOGLU K.,  TURKER OZKAN  M. and  HUSEYINMENTESE H.
    <Astrophys. Space Sci.,164,263,1990.>
    A comparison  of  the  near-ultraviolet  continuum  and  chromospheric
    emission line fluxes of the late-type giant stars.

1990Ap&SS.169...77B: BELMONTE  J.A.,  JONES  A.R.,  PALLE  P.L.  and  ROCA
    CORTES T. <Astrophys. Space Sci.,169,77,1990.>
    Acoustic oscillations in the K2III star Arcturus.

Do you want to see more ? n

[NAME ARCTURUS] display -> bye
```

Note that once you have finished with one object, you have to type **bye**, which leads you to the main prompt:

```
Simbad search ->
```

allowing you to search for something else. You can, more generally to type **bye** each time you want to go back to the main prompt.

When you have finished, type: **stop** in order to leave the database.

Part II

USER'S GUIDE

Chapter 5

How to retrieve information for one object ?

On entering the software, you get the first prompt:

```
simbad search ->
```

This prompt must be seen as a partial command that has to be completed with parameters by the user to obtain information from the database.

The parameters can be:

- **A single identifier** to obtain the data corresponding to an astronomical object (*this chapter*).
- **Coordinates** to get all objects within a given radius around the central position (chapter 6).
- **A filter name** to make a sample (chapters 7 and 16).
- **A reference code** to get the corresponding bibliographical reference (chapter 14).

5.1 Object identifiers: how to type them

The syntax of an identifier is the following:

- the abbreviated catalogue name (one to four characters), followed by
- a number or a name within the catalogue.

The catalogue name should be followed by at least one space (not necessary when the identifier field begins with a sign, like in a BD number).

Examples:

```
HD 187642
M 31
BD+8 4236      or    BD +8 4236     or    BD +08 4236
```

Altair, α Aquilae, and RR Lyrae should be typed:

```
NAME ALTAIR      * ALF AQL     and      V* RR LYR
```

where `NAME`, `*`, and `V*` are the catalogue names.

A few hints:

Case sensitivity: SIMBAD is not case-sensitive at this level: `* ALF AQL` or `* alf Aql` are, for instance, both accepted. But note that star's names or appellations stored under the generic catalogue 'NAME' (`ALTAIR`, `SIRIUS`, `VEGA`, `BARNARD'S STAR`, etc.) should be typed in upper-case letters.

Greek letters: should be abbreviated as three letters: `alf`, `bet`, for α and δ, but also `mu.` `nu.` and `pi.` (with a dot), for μ, ν and π. The complete table is given as Appendix A.

Constellations: constellation names should be abbreviated with the usual three letters: `* alf Boo`, `* del Sct`, `V* FG Sge`, `NOVA Her 1991`. The complete table is given as Appendix B.

Multiple systems: Identifiers of a multiple system may generate a list of the objects of the system. For instance, `ADS 5423` calls for the four components, A to D, of the stellar system around Sirius. How to deal with a list of objects is described in the next chapter.

Component letter: Component letters should be typed as upper case letters, which may be separated by a space: `HD 48915B` or `HD 48915 B` are accepted[1].

Supernovae are to be typed as `SN 1987A` or `SN 1987 A` .

Cluster stars: The nomenclature for cluster stars is rather complex: it includes the cluster name followed by a number, or cluster name followed by a list name and a number in the list. A detailed description is given in Appendix C. Examples are: `NGC 2264 10`, `CL Melotte 25 1`.

Catalogue abbreviations: A list of the catalogue names, abbreviations, or acronyms used is available as a separate document (*Catalogue Acronyms and Abbreviations in SIMBAD*).

info cat: An on–line help is provided by the **info cat** commands, which are described in chapter 11.

[1] Note that `BD +04 3561a` is not `BD +04 3561A` (additional star in the BD catalogue, not component of a system). Rather confusing, isn't it ?

Unknown name ?: If the identifier you have is not accepted by Simbad, or simply not found, try one thing: enter the coordinates of the object (chapter 6); if the object is in Simbad under a different name, you will find it.

An ampersand (&) immediately after an identifier makes a generic interrogation of the objects following a given object (in the order of the catalogue). The ampersand itself can be followed by a number modifying the default number of 10 consecutive objects.

Examples:
`HR 5999&` generates a list of ten objects: `HR 5999`, `HR 6000`, `HR 6001`, etc.
`NGC 2264 1&20` retrieves stars 1 to 20 in open cluster NGC 2264.

5.2 Retrieving the data for one object

Imagine you want to list all the information available (basic data and identifiers, observational data or measurements, and bibliographical references) for the star AG+89 15. First, type the identifier:

```
simbad search -> AG+89 15
```

```
Type: star
Coord 1950.0 = 07 12 31.19  +89 44 52.0       mb, mv =  9.4        8.9
Coord 2000.0 = 09 46 18.31  +89 34 09.4    sp type = A5
           gal = 123.28 +27.43
       pm =  +0.007  [   3]   +0.011  [   3]
------------------------------------------------------------------------------
AG+89 15                  AGKR 6504                 BD+89 3
HD 21070                  SAO 1157
------------------------------------------------------------------------------
Measurements:
PM: 2     pos: 2    SAO: 1
------------------------------------------------------------------------------
References: 0
------------------------------------------------------------------------------
```

The basic data and the identifiers are displayed automatically. Note that the main prompt has been replaced by the following one:

```
[AG+89 15] display ->
```

The software makes the queried astronomical object current ([AG+89 15] is its name), with the default action **display**. By typing a [CR] , you execute the command like it is shown in the prompt:

[AG+89 15] display

and get all the data displayed, according to the current format.

The astronomical object remains current, as well as the action *display* . You can, for instance, display the data again, or a part of them by typing the following keywords :

basic	for basic data
id	for the identifiers
ndata	gives the number of observational measurements
data	for the observational measurements
cat	displays the measurements of catalog *cat* (Example: `UBV`)
all	for all the observational measurements
nbib	gives the number of bibliographical references
bib	for the bibliographical references
bibcode	for the bibliographical reference codes
bye	for leaving the object

The keyword **catalog** allows to generate a permanent change of the environment (i.e. the current format):

catalog cat-name cat-type	for the measurements concerning all catalogues (**A**), or a specific catalog defined by its name and the following keyword:
	`F` first measurement
	`M` mean value or first one if none
	`A` all measurements

This change is valid until the end of the session, unless you restore the default format (all data) by typing **catalog A A**.

The following parameters can be set:

bibyears *y1/y2*	will limit the display of the bibliography to the given years (papers published between 1970 and 1990: **bibyears 1970/1990**)
equi1 *year.d*	will set first equinox (example: **equi1 1950.0**)
equi2 *year.d*	will set second equinox (example: **equi2 1990.0**)

These parameters and keywords modify the standard (default) format and this change remains valid until the end of the session, unless you restore the default format by typing

bibyears 1850/2000

equi1 1950.0

equi2 2000.0

You may also create your own keywords within your own format (see chapter 18: "Defining formats").

Example: You want to list the information available for the star AG +89 15. The output will be as follows:

```
[AG+89 15] display -> [CR]

==== AG+89 15 (star)
Coord 1950.0 = 07 12 31.19  +89 44 52.0     mb, mv =  9.4        8.9
Coord 2000.0 = 09 46 18.31  +89 34 09.4    sp type = A5
          gal = 123.28 +27.43
       pm =  +0.007  [   3]   +0.011  [   3]
-------------------------------------------------------------------------------
AG+89 15                  AGKR 6504                 BD+89 3
HD 21070                  SAO 1157
-------------------------------------------------------------------------------

PM  | pm-ra [ m.e ]| pm-de [ m.e ]|     reference     |
-----------------------------------------------------
PM  |  +.007[ .003]|  +.011[ .003]|1971$AGK3.C.......L|
PM  |  +.000[ .001]|  +.010[ .008]|1978$AGKR.C.......C|

pos  |    alpha        delta    |me.al me.de|equi  epoch |     reference     |
-------------------------------------------------------------------------------
pos  |07 12 31.083 +89 44 52.09 | .07   .07 |1950 1959.36|1971$AGK3.C.......L|
pos  |07 12 29.689 +89 44 51.66 | .05   .22 |1950 1931.86|1978$AGKR.C.......C|

Do you want to see more ?  y

SAO  |   alpha          delta    : m.e| pm-ra :m.e| pm-de :m.e|
          reference     |
-------------------------------------------------------------------------------
SAO m|07 12 31.190 +89 44 52.04  : .13|  +.003:006|  +.008:006|
      1966$SAO..C.......S|

-------------------------------------------------------------------------------

1950ApJ...111...65E: EGGEN O.J. <Astrophys. J.,111,65,1950.>
    Photoelectric studies -1-  Color-luminosity array  for members  of the
    Hyades cluster.

1950ApJ...112..240J: JOHNSON H.L. <Astrophys. J.,112,240,1950.>
    The color-magnitude array for the galactic cluster NGC 2362.

1950ApJ...112..469S:  STEBBINS   J.,  WHITFORD   A.E.  and   JOHNSON  H.L.
```

```
    <Astrophys. J.,112,469,1950.>
    Photoelectric magnitudes and colors of stars in Selected Areas 57,
    61and 68.

Do you want to see more ?  y

1950$BAI...11..441W: WALRAVEN T. and FOKKER A.D. <Bull. Astron.
    Inst.,11,441,1950.>
    Photoelectric colours of B and A-type stars in a number of selected
    areas.

1951ApJ...114..141E: EGGEN O.J. <Astrophys. J.,114,141,1951.>
    Photoelectric studies -8- Positional effect in photomultipliers and
    some revised magnitudes in the North Polar Sequence and Harvard
    Region C12.

1951ApJ...114..492R: ROMAN N.G. <Astrophys. J.,114,492,1951.>
    A study of the concentration of early-type stars in Cyg.

1951ApJ...114..522J: JOHNSON H.L. and MORGAN W.W. <Astrophys.
    J.,114,522,1951.>
    On the color-magnitude diagram of the Pleiades.

1952ApJ...115..479M: McCUSKEY S.W. <Astrophys. J.,115,479,1952.>
    Variations in the stellar luminosity function -5- A region in Cam.

Do you want to see more ?  y

1952ApJ...116..272J: JOHNSON H.L. <Astrophys. J.,116,272,1952.>
    On magnitude systems.

1952ApJ...116..612W: WEAVER H.F. <Astrophys. J.,116,612,1952.>
    Spectral type, magnitude and color-index relations in the galactic
    star cluster in Com.

1953ApJ...117...83C: COX A.N. <Astrophys. J.,117,83,1953.>
    The transfer of the North Polar standards to the Southern hemisphere.

1955AnA....18..292J: JOHNSON H.L. <Ann. Astrophys.,18,292,1955.>
    A photometric system.

1955AJ.....60...65E: EGGEN O.J. <Astron. J.,60,65,1955.>
```

```
    Magnitudes and colors for 833 Northern and Southern stars.

1958AJ.....63..474B:    BALZ   A.G.A.   and    VYSSOTSKY   A.N.   <Astron.
    J.,63,474,1958.>
    Photographic  and photovisual magnitudes of  stars in Harvard Standard

Do you want to see more ?  y

    C regions.

1961SvA.....5..575K: KADLA Z.I. <Sov. Astron.,5,575,1961.>
    Positions  and  proper  motions  of  stars  observed  with  the  polar
    telescope at Pulkovo.

1976AsT...931....4K: KRASIKOV A.A. <Astron. Tsirk.,931,4,1976.>
    Coordinates  of Polarissima BD +89 3  from I.A. Dyukov observations in
    1932-1935.

1977JBAA...87..369J: JONES A.W. <J. Br. Astron. Soc.,87,369,1977.>
    Mean places for 42 of the brighter stars within 1 of the NCP-1978.0.

1978PASP...90..739G:  GAUTHIER R.P.  and FERNIE  J.D. <Publ.  Astron. Soc.
    Pac.,90,739,1978.>
    The reddening of Polaris.

[AG+89 15] display -> basic

==== AG+89 15 (star)
Coord 1950.0 = 07 12 31.19  +89 44 52.0     mb, mv =  9.4        8.9
Coord 2000.0 = 09 46 18.31  +89 34 09.4    sp type = A5
          gal = 123.28 +27.43
       pm =  +0.007  [   3]   +0.011  [   3]
------------------------------------------------------------------------

[AG+89 15] display -> id

AG+89 15                  AGKR 6504                BD+89 3
HD 21070                  SAO 1157
------------------------------------------------------------------------

[AG+89 15] display -> all
```

```
PM  | pm-ra [ m.e ]| pm-de [ m.e ]|     reference     |
-----------------------------------------------------
PM  |  +.007[ .003]|  +.011[ .003]|1971$AGK3.C.......L|
PM  |  +.000[ .001]|  +.010[ .008]|1978$AGKR.C.......C|

pos  |    alpha        delta    |me.al me.de|equi  epoch |     reference     |
-------------------------------------------------------------------------------
pos  |07 12 31.083 +89 44 52.09 | .07   .07 |1950 1959.36|1971$AGK3.C.......L|
pos  |07 12 29.689 +89 44 51.66 | .05   .22 |1950 1931.86|1978$AGKR.C.......C|

SAO  |   alpha          delta    : m.e| pm-ra :m.e| pm-de :m.e|
          reference     |
-------------------------------------------------------------------------------
SAO m|07 12 31.190 +89 44 52.04  : .13|  +.003:006|  +.008:006|
      1966$SAO..C.......S|
```

[AG+89 15] display -> **PM**

```
PM  | pm-ra [ m.e ]| pm-de [ m.e ]|     reference     |
-----------------------------------------------------
PM  |  +.007[ .003]|  +.011[ .003]|1971$AGK3.C.......L|
PM  |  +.000[ .001]|  +.010[ .008]|1978$AGKR.C.......C|
```

[AG+89 15] display -> **bibyears 1970/1990**

[AG+89 15] display -> **bib**

```
1976AsT...931....4K: KRASIKOV A.A. <Astron. Tsirk.,931,4,1976.>
    Coordinates  of Polarissima BD +89 3  from I.A. Dyukov observations in
    1932-1935.

1977JBAA...87..369J: JONES A.W. <J. Br. Astron. Soc.,87,369,1977.>
    Mean places for 42 of the brighter stars within 1 of the NCP-1978.0.

1978PASP...90..739G:  GAUTHIER R.P.  and FERNIE  J.D. <Publ.  Astron. Soc.
    Pac.,90,739,1978.>
    The reddening of Polaris.
```

[AG+89 15] display -> **equi1 1900.0**

[AG+89 15] display -> **equi2 1990.0**

[AG+89 15] display -> **basic**

```
==== AG+89 15 (star)
Coord 1900.0 = 03 18 51.46  +89 41 12.1     mb, mv =  9.4        8.9
Coord 1990.0 = 09 27 30.97  +89 36 52.1    sp type = A5
          gal = 123.28 +27.43
       pm =  +0.007  [   3]   +0.011  [   3]
--------------------------------------------------------------------------------

[AG+89 15] display ->
```

This prompt remains current as long as you do not quit the astronomical object, after having displayed its data. This is done by the action verb *bye* :

```
Simbad-obj display -> bye
```

Chapter 6

Accessing by coordinates

6.1 Query by coordinates

The second most common use of SIMBAD is to search by positional parameters, or coordinates.

Such a query will give you access to all objects present in a small circle around the given coordinates. All objects within the specified radius and included in the data base are retrieved and an *object list* if available for scrutiny. You can then examine the selected objects individually, or as a group.

Selected objects are listed in order of increasing distance from the specified position (*not yet implemented*).

6.2 Coordinates format and equinox

The coordinates must be written in the order α, δ without forgetting the sign for the declination zone. The input may be `hh mm.m +dd mm`, or `hh mm ss.ss +dd mm ss.s`, etc. in free form, but the sign of the declination must be included (even if positive) because the sign is used to parse the positional values.

The default value for the equinox is the standard equinox in the database (presently: 1950.0). It can be overwritten by the command **cooequinox 2000.0**, if, for instance, you want to input coordinates at the equinox 2000.0.

Note that this equinox value may well be different from the ones corresponding to the coordinates displayed in the basic data (e. g. with the command **"astrobj display basic"**). The default values for these two sets of displayed coordinates is (presently) 1950.0 and 2000.0, values which can be modified with the following command: **equi1 value**, and **equi2 value**.

The coordinates are originally stored in the database under their 1950.0 value. No change of epoch, using the proper motions, is performed. This feature will be implemented later

on, together with a move to the J2000 IAU standard.

6.3 Search radius

The default value for the radius is 10 arcmin. However this can be modified by the command **cooradius** *value* (the value is to be given as decimal or sexagesimal degrees (warning ! give the value in degrees, not arcmin or arcsec). Here are two equivalent examples of the possible syntax for changing the value to 30 arcmin:

```
Simbad search -> cooradius 0 30
```

```
Simbad search -> cooradius 0.5
```

This change remains valid until the end of the session (unless you enter a new cooradius value).

6.4 The object list

The query by coordinates produces a list of objects, which can of course consist of only one object.

You will therefore first interact with an *object list* agent. The agent will display a short list of all retrieved objects (one line per object). You have the possibility to display one or several specific objects of the list, save the list, or merge it with another one. How to do that is explained in detail in the chapter 17: "Managing an object list". We give here the most useful commands:

`simbad-coolist display ->`	**all**	all objects
	$+n$	n objects from the current one
	n	object # n
	bye	leaves the current agent

6.5 Example

Enter coordinates required (not forgetting the declination sign):

```
simbad search -> 18 35 +38 45
```

```
==== coo 18 35 +38 45  -  8 objects:
#1   | *|AG+38 1709          |18 34 59.57  +38 38 52.1 |?       |10.9 -     |0
#2   | *|BD+38 3235B         |18 34 57.3   +38 39 07   |?       |     -11.1 |0
#3   | *|HD 172167           |18 35 14.655 +38 44 09.67|A0V     | 0.03- 0.03|785
```

```
#4   | *|AG+38 1712          |18 35 15.25  +38 43 06.3 |?       |10.8 -      |0
#5   | *|BD+38 3238C         |18 35 10.1   +38 44 23   |?       |     -11.0 |0
#6   | *|BD+38 3238E         |18 35 15.5   +38 44 23   |?       |     - 9.5 |0
#7   | *|ADS 11510 D         |18 35.2      +38 45      |?       |           |0
#8   | *|EQ 183456.7+384615.4|18 34 56.7   +38 46 15   |        |           |1
```

There are 8 objects within a radius of 10 arcmin. You receive the type of object (asterisk for stars, G for galaxies, ? for other non–stellar objects), one name, the coordinates, spectral type, magnitudes, and, at the end, the number of bibliographical references.

Request one of the object, by number (for example: the second one):
`simbad-coolist display ->` **2**

```
Type: star
Coord 1950.0 = 18 34 57.3   +38 39 07       mb, mv =       :    11.1  :
Coord 2000.0 = 18 36 38.2   +38 41 43    sp type = ?
           gal =  67.34 +19.26
      ./.
-------------------------------------------------------------------------------
BD+38 3235B               IDS 18333+3236 B          CSI+38 3235 2
-------------------------------------------------------------------------------
Measurements:
-------------------------------------------------------------------------------
References: 0
-------------------------------------------------------------------------------
list-obj display ->
```

Note that this brings you to the level of prompt corresponding to one object of the list: type **bye** in order to go back to the list level, where you can continue to request objects from the list.

`list-obj display ->` **bye**

`simbad-coolist display ->` **3**

```
Type: star
Coord 1950.0 = 18 35 14.655 +38 44 09.67       mb, mv =  0.03       0.03
Coord 2000.0 = 18 36 55.377 +38 46 46.78    sp type = A0V
           gal =  67.44 +19.24
       pm =  +0.200  [   1]   +0.285  [   1]
-------------------------------------------------------------------------------
HD 172167                 GEN# +1.00172167          UBV M 23118
SKY# 34103                SAO 67174                 GC 25466
```

```
N30 4138                  TD1 22883                 BD+38 3238
PLX 4293                  GJ 721                    IRC +40322
HR 7001                   AFGL 2208                 * 3 Lyr
* alf Lyr                 NAME VEGA;                ADS 11510 A
AG+38 1711                CEL 4636                  FK4 699
GCRV 11085                HGAM 706                  JP11 2999
ROT 2633                  UBV 15842                 1E 183515+3844.3
CSI+38 3238 1             V* alf Lyr                LTT 15486
NSV 11128                 IRAS 18352+3844           SV* SVS101745
CSV 101745
--------------------------------------------------------------------------------
Measurements:
Do you want to see more ? yes
TD1: 1    UBV:13    PM: 2     pos: 2    GJ: 1     GEN: 1    MK:33
JP11: 5   IRC: 1    CEL: 1    UVBY: 7   PLX: 4    GCRV:16   ROT: 2
SAO: 1    hbet: 3
--------------------------------------------------------------------------------
References: 785
--------------------------------------------------------------------------------
```

```
list-obj display -> bye
```

Type **all**, or simply hit [CR] in order to repeat displaying the list.

```
simbad-coolist display ->all
```

```
#1   | *|AG+38 1709          |18 34 59.57  +38 38 52.1 |?       |10.9 -     |0
#2   | *|BD+38 3235B         |18 34 57.3   +38 39 07   |?       |     -11.1 |0
#3   | *|HD 172167           |18 35 14.655 +38 44 09.67|A0V     | 0.03- 0.03|785
#4   | *|AG+38 1712          |18 35 15.25  +38 43 06.3 |?       |10.8 -     |0
#5   | *|BD+38 3238C         |18 35 10.1   +38 44 23   |?       |     -11.0 |0
#6   | *|BD+38 3238E         |18 35 15.5   +38 44 23   |?       |     - 9.5 |0
#7   | *|ADS 11510 D         |18 35.2      +38 45      |?       |           |0
#8   | *|EQ 183456.7+384615.4|18 34 56.7   +38 46 15   |        |           |1
```

```
simbad-coolist display -> stop
```

Chapter 7

How to create a list of objects: the filter

7.1 Query by filter (or sampling)

In the Query by filter (or sampling) mode, you can retrieve a list of objects according to specific criteria. These criteria constitute a filter[1].

Note: In general a set of criteria should include some limitations in coordinates. These limitations allow to define a range of coordinate boxes which includes the requested area: all the objects from these boxes are read and checked against the whole set of criteria. SIMBAD has been divided for that into 6145 boxes allowing an optimized access by coordinates.

When a set of criteria includes no limits in sky position, the complete database is to be scanned.

7.2 Don't forget the quote

Sending to the agent *simbad* a filter name will trigger sampling.

One precaution is needed here. The filter is also an agent. So, if you just type its name after the prompt *simbad search* , the programme will think[2] that you want a dialogue with the filter agent. It will not consider the filter name as a parameter to the *simbad* agent and its current verb. To avoid this, you must precede the filter agent name with a quote character (').

Your command will look like:

`Simbad search ->'`*filter-name*

[1] In fact, the query by coordinates is also a query by filter, where the criteria are a search radius and a given position

[2] I know, programmes don't really think

Sampling generates a selection of all objects from the database fulfilling the specific criteria you define. Sampling builds an *object list* agent which is used after the sampling command for displaying objects, merging the list with another one, etc. See chapter 17: "Managing an object list".

Sampling is done in two steps:

- First, you need to define a *filter* agent containing the sample criteria written as a set of instructions. Such *filters* can be kept from one session to another. So, if the agent with its criteria set is already existing, you need just to load it in the session.
- Then, you send a command to `simbad search ->` with the filter name as parameter.

The sample results are managed by a new agent: an *object list* agent.

7.3 Defining a filter

You get access to an existing filter, or define a new one, through the following command: "**session use filter** *filtername*" where *filtername* is the name of the filter you want to use for sampling the database.

After this command, if the filter named *filtername* already exists, it becomes available in the session, for modification (through "*filtername* **set** ") or immediate use in a query (`database search ->`'**filtername**).

If no filter agent exists under the name *filtername*, a new one is created, and the command "*filtername* **set** " is invoked to allow to define the sampling criteria using a text editor. Usage of the text editor is described in chapter 25.

7.4 Writing filtering instructions

A simple filtering instruction is made of one criterion. Each criterion comprises a keyword and parameters, generally made of a lower limit and an upper limit or some name.

Example:
```
MB 6.5/9.0
CAT SAO
```

Criteria can be combined in the following way:

- Criteria written on different lines correspond to the `AND` operator:

```
MB 6.5/9.0
CAT SAO
```

Select all objects having magnitude B between 6.5 and 9.0 **and** having an SAO identifier.

- Criteria written on one line separated by a '|' character correspond to the `OR` operator:

```
MB 6.5/9.0 | MV 6.0/8.5
```

Select all objects having B magnitude between 6.5 and 9.0 **or** V magnitude between 6.0 and 8.5.

Any number of instructions and criteria may be written in one filter. The total size of the resulting sample is not limited.

All available instructions for defining a filter are described in the chapter 16.

7.5 Example

We will create a filter named *target*, retrieve the corresponding list of objects (SAO stars, of a given magnitude range, in a given field), and then display in more detail the 11th object found.

```
simbad search ->session use filter target
target set ->[CR]
"target.ftr" [New file]
```
here, type **i** *for input mode, then enter the text of the filter*

```
FIELD  18 00  -12 00   DIM  3/3
MB  6.5/9.0
CAT  SAO
~
~
```

type [esc] then **:wq** *for leaving the editor*

```
"target.ftr" [New file] 3 lines, 53 characters
target set ->bye
session use ->bye
simbad search ->'target

Number of objects found:       16
#1   | *|YZC 11 6113        |17 54 48.67  -11 31 42.9 |G0      | 8.4 - 7.8 |0
#2   | *|YZC 11 6127        |17 57 10.11  -11 32 38.1 |A5      | 9.0 - 8.8 |0
```

```
#3   | *|YZC 11 6129        |17 57 32.91  -11 15 29.6 |A5       | 8.9 - 8.7 |0
#4   | *|HD 164026          |17 56 53.68  -12 20 49.0 |G8/K0IV  | 8.9 - 7.9 |0
#5   | *|HD 164047          |17 57 00.06  -12 08 54.5 |A8/A9V   | 8.8 - 8.6 |0
#6   | *|HD 164165          |17 57 37.69  -12 59 13.0 |B8/B9III| 7.4 - 7.4 |1
#7   | *|HD 163977          |17 56 39.15  -13 01 45.5 |A9V      | 8.6 - 8.4 |0
#8   | *|HD 164485          |17 59 07.21  -13 08 51.8 |Ap...    | 8.9 - 8.7 |0
#9   | *|YZC 11 6153        |18 01 33.79  -10 54 50.6 |G0       | 8.2 - 7.5 |0
#10  | *|YZC 11 6159        |18 02 19.92  -10 30 34.4 |A5       | 9.0 - 8.8 |0
#11  | *|YZC 11 6177        |18 05 31.14  -10 33 31.2 |Am       | 8.13- 7.81|7
#12  | *|YZC 11 6160        |18 02 44.46  -11 01 28.6 |A5       | 7.4 - 7.3 |2
#13  | *|YZC 11 6157        |18 02 15.66  -11 30 44.6 |A2       | 8.3 - 8.2 |0
#14  | *|HD 165361          |18 03 18.29  -12 21 25.0 |F7IV+...| 9.0 - 8.5 |0
#15  | *|HD 165781          |18 05 30.04  -12 42 13.6 |A2/A3III| 8.9 - 8.7 |0
#16  | *|HD 165546          |18 04 12.82  -13 14 33.6 |A0III    | 8.6 - 8.6 |0

simbad-list1 display ->11

Type: star
Coord 1950.0 = 18 05 31.14  -10 33 31.2       mb, mv =  8.13       7.81
Coord 2000.0 = 18 08 17.27  -10 33 01.0    sp type = Am
           gal =  18.59  +4.60
      ./.
-------------------------------------------------------------------------------
YZC 11 6177               HD 165830                GEN# +1.00165830
SAO 161101                SKY# 32968               UBV M 22647
BD-10 4616                JP11 2935                TD1 21686
-------------------------------------------------------------------------------
Measurements:
UBV: 1    MK: 2     JP11: 1   TD1: 1
-------------------------------------------------------------------------------
References: 7
-------------------------------------------------------------------------------

list-obj display ->bye
simbad-list1 display ->bye
simbad search ->
```

Chapter 8

Querying from a list

8.1 Storing a file on the SIMBAD host computer

This query mode implies that a file containing either a list of object identifiers, or a list of coordinates, is stored under your account on the Simbad host computer.

This can be done by sending it from your home computer by **ftp** (using Internet) or through a **Decnet copy** (using SPAN). The Simbad staff will take care of erasing unused files after a few months.

Each line of the file should be an identifier (command **idlist**) or a set of coordinates (command **coolist**).

8.2 idlist and coolist

It is suggested to check on a few entries the format of the result produced by the database (it is a function of the current environment).

The selection of the data to be collected —defined in the current environment— can be modified by typing:

basicdata	coordinates, mag., sp. type and proper motions. (default value)
bibliography	only references codes
maxdata	all available data

If you are using coordinates, check the **cooradius** and **cooequinox** values (see chapter 6).

Then, use the list of identifiers or coordinates contained in specific file (of name *filename*), as follows:

`Simbad search ->`	**idlist** *filename*	for identifier list
`Simbad search ->`	**coolist** *filename*	for coordinates list

When only reference codes are used, the text of the bibliographical references may be

displayed once at the end of the session, using the command:

`Simbad search ->` **reftext**

This is especially useful for lists of astronomical objects having references in common.

8.3 Example

Let us suppose you have `ftp`'ed the following file to the Simbad computer, under the name `list.dat`:

```
HD 1
SAO 2
NGC 3
```

Using the default value (basic data) you will obtain the following output:

`simbad search ->` **idlist list.dat**

```
Type: star
Coord 2000 = 00 05 08.65  +67 50 23.7       mb, mv =  8.8        7.6
Coord 1950 = 00 02 32.23  +67 33 41.8    sp type = K0
           gal = 118.57  +5.36
       pm =  +0.007  [   3]   +0.009  [   4]
-------------------------------------------------------------------------------
SKY# 146                  HD 1                      SAO 10963
AG+67 4                   AGKR 39                   BD+67 1599
-------------------------------------------------------------------------------
Measurements:
SAO: 1    PM: 2     pos: 2
-------------------------------------------------------------------------------
References: 6
-------------------------------------------------------------------------------
Type: star
Coord 2000 = 00 02 45.75  +80 16 55.8       mb, mv =  8.3        7.7
Coord 1950 = 00 00 09.61  +80 00 13.8    sp type = F2
           gal = 120.79 +17.61
       pm =  +0.056  [   6]   +0.025  [   4]
-------------------------------------------------------------------------------
SKY# 78                   HD 225020                 SAO 2
AG+80 1                   AGKR 3                    BD+79 799
GC 4                      TD1 30250                 ADS 5 A
CSI+79 799 2
```

```
-------------------------------------------------------------------------------
Measurements:
TD1: 1    SAO: 1    PM: 3     pos: 3
-------------------------------------------------------------------------------
References: 3
-------------------------------------------------------------------------------
Type: galaxy
Coord 2000 = 00 07 16.6   +08 18 05       mb, mv = 14.6  :
Coord 1950 = 00 04 42.7   +08 01 23     morph. type = S0:
           gal = 104.58 -52.99
       dim =   1.13  0.21113 (~)
-------------------------------------------------------------------------------
Z 0004.7+0802             NGC 3                     Z 408 -35
UGC 58                    MCG+01-01-0037            ARK 1
-------------------------------------------------------------------------------
Measurements:

-------------------------------------------------------------------------------
References: 2
-------------------------------------------------------------------------------
simbad search ->
```

Chapter 9

Using SIMBAD in batch mode

9.1 Introduction to SMBMAIL

The facility documented in this chapter is not used in *interactive* mode (i.e. when you log into Simbad, and have a dialog with the database management system) but *through electronic mail*, without needing to establish an interactive connection with the SIMBAD host computer.

The **smbmail** facility allows a SIMBAD user to send by electronic mail a file containing a header, an optional list of commands, and a list of astronomical objects or a list of coordinates. After execution, the result of the query is sent back by mail, using an E-mail address provided in a header.

It is especially well suited for long lists or sampling queries (you do not want to keep the connection open while the database is processing the query) or for users who have no easy access to an interactive network. This facility can as well be used through Bitnet or any other network.

The query file should be sent to one of the following addresses:

SPAN:	SIMBAD::SMBMAIL
INTERNET:	smbmail@simbad.u-strasbg.fr
EARN/BITNET:	smbmail@simbad.u-strasbg.fr

9.2 The format

The file must have the following structure:

1. **A header:** It consists of three lines (mandatory) :
   - the first line should be "**SIMBAD interrogation**".
   - the second line contains the keyword **username:** followed by your simbad *username* (userid)

- the third line gives the keyword **mailaddr:** followed by your E-mail address for return. It should have one of the following syntaxes:
  SPAN (Decnet): *NODE::USERID*
  INTERNET: *userid@node.domain*
  EARN/BITNET: *userid@node.bitnet*

Example:

```
SIMBAD interrogation
username: u01abcd
mailaddr: smith@cfa.harvard.edu
```

2. A command list: Such a list is optional. If not present, the default values will be used. If it exists, it must begin with the keyword 'commands:' followed by lines containing SIMBAD commands.

Example:

```
...
commands:
bibyears 1980/1990
maxdata
...
```

Comment 1: The default format for a search by object gives the basic data. Other usual formats can be obtained by the following commands (see also chapter 18 for the syntax):

all data and refs:	**maxdata**
or (equivalent) :	**/env set FM-IMMEDIATE=fm-standard**
list (one line per object):	**/env set FM-IMMEDIATE=fm-list**
bibliographic codes only:	**bibliography**

More formats (and maybe more friendly names) will be available soon.

Comment 2: The default format for a list (e.g. search by coordinates) is: one line per object. Other usual formats can be obtained by the following commands:

for all data and refs:	**maxdata**
for basic data only:	**basicdata**
bibliographic codes only:	**bibliography**

3. Identifier or coordinates list: An identifier list begins with **idlist:** as keyword. A coordinate list begins with **coolist:** as keyword.

Example 1:

```
...
idlist:
HD 123
SAO 4321
*V RR LYR
```

Example 2:

```
...
coolist:
12 34 +56 01
2 12 45 -01 10 11
```

9.3 SMBMAIL examples

Here are some complete examples:

List of identifiers for which all data are required

```
SIMBAD interrogation
username: xxxxxx
mailaddr: SPANOD::userid
commands:
maxdata
idlist:
HD 1
SAO 2
NGC 3
```

Simple query of a coordinate list

```
SIMBAD interrogation
username: xxxxxx
mailaddr: XXXXXX::yyyy
coolist:
12 30 +30
12 30 +40
12 30 +50
```

Sampling

Here the command section is alone and executes the query (a search of objects in a field). No list section is present.

```
SIMBAD interrogation
username: xxxxxx
mailaddr: XXXXXX::yyyy
commands:
/session use filter fff
FIELD 12 30 +30 DIM 10/10
MB -2/+8
bye
simbad search fff
```

Chapter 10

Keeping a log of your session

Simbad offers you a very simple solution for keeping a log file of all (or a part of) your session, and mailing it back to your home computer.

It is done by using the following commands:

log		keeps a log of the session in a file 'simbad.log'
sendlog	*user@node.domain*	sends the log file through e-mail (Internet)
sendlog	*node::user*	(or DECNET–SPAN)

The **log** command opens the file `simbad.log`. The command **sendlog** closes it, and mails it to the given address. The file `simbad.log` contains the SIMBAD output produced between the log and the sendlog command.

The following commands will also be helpful:

cont	for continuous display mode
page	to restore page by page mode
undisplayed	to stop screen display
displayed	to restore screen display

These keywords are macros (see chapter 24), generating commands to the UIF (user interface) agent. Chapter 21 describes in more details how to manage the user interface, the log file, and other output files.

Chapter 11

SIMBAD Help

At any prompt, you can obtain a context-sensitive help by typing a question mark:

?

or a general help by typing

help

Details about catalogue names can also be obtained from the **info** command:

info -help	lists the main functionalities of the command
info IAU	lists the IAU Recommendations concerning Nomenclature
info cati *AB*	lists catalogues with acronyms starting with `AB`
info cato *X*	lists catalogues dealing with X-ray sources (object type)
info cata *Author*	lists catalogues with first author named `Author`
info cat *keyword*	lists catalogues according to presence of specified word in catalogue title or remarks

Use of the **-l** option provides a long description, including the authors, the bibliographical reference with the title of the paper. Example:

info -l cati *name*

The info command lists on the screen[1] the contents of two files:

1. the first one is the list of catalogue abbreviations in SIMBAD (*Catalogue Acronyms and Abbreviations in SIMBAD*, also available as a separate printed document) giving the type of object, the catalogue acronym, reference and format as used in the database.

2. the second gives complementary information from the *Dictionary of Nomenclature of Celestial Objects* produced and maintained at Observatoire de Paris by Lortet et al. Efforts are being made (with the support of IAU Commission 5) to solve existing discrepancies or ambiguities which may still appear in this field.

[1] using the Unix tool 'More'

You can view more pages by pushing the space bar, or quit by typing **q**.

The Help agent (named *hhelp*) manages the hierarchical help system. It knows two verbs: **display** and **bye**, which has the standard effect.

The command **help** (alias of hhelp display) displays the root of the hierarchical help. Navigating through the topics and subtopics is done in the same way as in the VAX/VMS hierarchical help system.

The most current use of the help agent is to obtain the "topic" screen associated with the current context. This is done by simply typing a question mark: (**?**).

Chapter 12

How to leave SIMBAD

When you have finished querying SIMBAD, type at any prompt:

stop

in order to leave the database.

Typing the action verb *bye* will also allow you to leave the session:

```
Simbad search -> bye
***cds >
```

This new prompt is displayed when the software has answered all your other requests. You can type a complete command here like **simbad search ...** or like the one needed to leave SIMBAD:

```
***cds > session exit
```

stop is a macro command equivalent to **session exit**.

Part III

MORE ABOUT SIMBAD FEATURES

Chapter 13

Simple SIMBAD concepts

For full understanding and maximum utilisation of SIMBAD, we must combine some simple concepts.

You will find in this section definitions of the main concepts encountered in this first *Simbad* session: *commands, agents, verbs* and *parameters.* A first idea of the current context will also be given.

A **command** is the complete instruction sent to the programme for execution. Every command has the following syntax:

AGENT VERB PARAMETERS

The **agent** is the main concept in Simbad: all requests from the user will be sent to agents. These requests are made by use of a *verb* and optionally **parameters**. Each agent present in a session has a name. In the first session, we interacted with three different agents:

1/ Simbad: The SIMBAD database.
2/ [HD 9902]: The current astronomical object in this database.
3/ Session: The session

The **verb** of the command defines the action requested from the agent. For instance:

Simbad search	is a request to *search* sent to the agent *Simbad* .
[HD 9902] display	is a request sent to an astronomical object agent called [HD 9902], asking it to display the data.
session exit	is a request sent to the agent *session* telling it to close the session.

Each agent knows several commands to execute, depending on its abilities.

The list of commands which can be sent to the agent which is in the current prompt may be obtained by typing &[CR].

The same verb can be used for different agents (display, for instance, can be used to show the instructions in a format or a filter). Of course, each agent will perform the appropriate action when receiving a request.

Agents having the same abilities are grouped in *categories*. We have already discovered the following categories: database, astronomical object and session.

Several agents of a same category may exist in a session. For example, we are able to use several formats simultaneously, compare different astronomical objects and even query more than one database in the same session.

The **parameters** depend on the command. For each command, there will be related parameters (or, maybe, no parameters). For instance, **HD 9902** —an identifier— is the parameter string for the command **simbad search**. The command **session exit** takes no parameters.

Complete SIMBAD software capability is contained in the knowledge of the available agents, the action verbs for each agent and the possible parameters for each verb.

The number of entities is not very high: about 10 agent categories, 5 to 10 verbs for each of them. The simple SIMBAD queries only use a fraction of those.

The management of a *current context* helps the user by reducing typing: partial commands are built into the prompt, and the user has only to complete them. This context consists of an agent name alone, called the *current agent*, and a *current verb*, or eventually of a complete command: agent verb and parameters. Executing such a complete command requires only a [CR] from the user.

This current context can be overwritten at any moment by typing another command, or just another request (verb and parameters) to the current agent. Let us consider, for example, some possible replies to the prompt

```
[HD 9902] display ->
```

[CR]	generates the full display of the data
basic	is a parameter (display only basic data)
bye	is a verb for the agent [HD 9902]
simbad search HR 5999	is a new command sent to the agent simbad

Interpreting a command typed by the user is always done in the following way: the programme looks if the first word is an agent name, or, if not, a verb known to the current agent. If none of them is recognized, then it considers that the user typed parameters for the current context.

Here is a comparison which should help you to understand the organization of SIMBAD:

> *Simbad* works like a post office: in a post office, you find positions, and, in each of them, an agent trained to perform certain functions: selling stamps, receiving parcels to send, paying postal orders, and so on. Some of these agents may respond to several requests. Others send you to a colleague to carry out your request.
>
> SIMBAD can be seen as a collection of different agents, each executing specific functions through different commands.

Knowing how to use SIMBAD consists of knowing the abilities of all agents and how to interact with them (using commands).

Chapter 14

The Contents of SIMBAD

The SIMBAD data base presently contains information for:

- about 650,000 stars;
- about 100,000 nonstellar objects (galaxies, planetary nebulae, clusters, novae and supernovae, etc.).

The only astronomical objects specifically excluded from SIMBAD are Solar System bodies.

In the following, the word *object* will be used to designate a star, nonstellar object, or collection of objects such as a cluster, which contain individual entries in SIMBAD. For each object, the following data are included:

- basic data (coordinates, magnitudes, etc.)
- cross identifications
- observational data for more than twenty different data types.
- bibliographical references.

14.1 Basic data

The basic data are displayed immediately after the object has been retrieved (immediate format) or when typing **basic** (standard format).

They consist of:

stars : object type, coordinates, spectral type, blue and visual magnitudes, and proper motion (including rms errors).

galaxies : object type, coordinates, blue and visual integrated magnitudes, morphological type, and dimension.

14.1.1 Object type

Presently SIMBAD contains a rough classification of objects into four categories:

code	definition
*	star
G	galaxy
G*	object in an external galaxy
?	nonstellar object (or unknown)

A more detailed classification scheme is under study.

14.1.2 Coordinates

The coordinates are originally stored in the database for equinox 1950.0. They can be computed at a different equinox (see chapter 6 and the EQUINOX1 and COOEQUINOX variables). No change of epoch, using the proper motions, is performed. This feature will be implemented later on, together with a move to the new J2000 IAU standard.

The coordinates are of a various sources. When astrometric data are available (SAO measurements or pos) the most accurate one has been selected.

The coordinates are displayed according to a precision code (stored in SIMBAD together with the coordinates) which can have the following values:

code	definition
0	1 ^{o}
1	1/10 ^{o}
2	1 '
3	1/10 '
4	1 "
5	1/10 "
6	1/100 "
7	1/1000 "

The default format gives equatorial coordinates at equinox 1950 and 2000, as well as galactic coordinates. This can be modified (see chapter 18). Ecliptic coordinates can also be computed on request.

14.1.3 Magnitudes

B and V magnitudes are given, when possible, in the Johnson's UBV system. Both magnitudes may be followed by a semicolon meaning they cannot be made homogeneous

to the UBV system. B and V magnitudes are separated by two columns which may contain the following flags:

- a 'D' flags a joint magnitude in a double or multiple system;
- a 'V' flags a variable magnitude and is followed by a coded index giving a rough estimate of the amplitude:

code	definition
1	1/100 mag.
2	1/10 mag.
3	1 mag.
4	more than 1 mag.
?	suspected variable

When possible the magnitudes have been taken from the UBV compilation of Mermilliod (Mermilliod, J.-C., 1987: A&A Sup. 71, 413), and from an earlier work by Ochsenbein (1974: A&A Sup. 15, 215).

14.1.4 Spectral type

The spectral types of stars have been selected in the Michigan Catalogues of Two-Dimensional Spectral Types for the HD stars (Houk N., 1975, and seq.), or in the bibliographical surveys of MK classifications (Jaschek M., 1978: CDS Inf. Bull. 15, 121). In the absence of a full MK classification, the HD spectral type is recorded.

Most of the spectral types need less than 5 characters, but this field can be as long as 36 characters. Complete syntax is given in Appendix D.

14.1.5 Morphological type

The morphological types of galaxies have been selected from the Uppsala General Catalogue of Galaxies (UGC, Nilson 1973), the Morphological Catalogue of Galaxies (MCG, Vorontsov-Vel'jaminov 1962-68), and other catalogues (see Dubois, Ochsenbein & Paturel: 1983, Bull. Inf. CDS 24, 125).

Complete syntax is given in Appendix E.

14.1.6 Proper motions

The proper motions ($\mu_\alpha \cos\delta, \mu_\delta$) are given in arcsec/year, together with their standard errors (in 1/1000 arcsec.) within brackets.

The source is SAO or other astrometric catalogue (see PM and SAO measurements).

14.1.7 Dimensions of galaxies

The following data, when available, are given for galaxies (for more details, see Dubois, Ochsenbein & Paturel: 1983, Bull. Inf. CDS 24, 125):

$\log D_{25}$	is the logarithm of the major axis a expressed in tenths of arc minutes;
$\log R_{25}$	is the logarithm of the ratio a/b where a and b are the major and minor axis;
orientation	orientation angle (in degrees)
(inclination)	inclination (in units of 15° from 0 to 7)

14.2 Cross–identifications

14.2.1 Aliases

Cross–identifications of stars and galaxies have been searched for SIMBAD entries from about 400 source catalogues, included, either completely or partially, in the data bank.

The list of *aliases*, thus constituted, is one of the unique features of the SIMBAD database.

A list of the catalogues used is available as a separate document (*Catalogue Acronyms and Abbreviations in SIMBAD*).

The **info cat** command (described in chapter 11) gives access to an on-line database of catalogue descriptions, which is maintained up–to–date in coordination with the *Dictionary of Nomenclature for Celestial Objects* produced at Observatoire de Paris, Meudon by M.-C. Lortet et al.

14.2.2 Multiple systems

It is to be noted that for a double system in which the components can be observed separately, SIMBAD will frequently include three entries: A and B components, and an additional entry for AB carrying the observational data and references related to the

system as a whole.

14.3 Observational data

Observational data (also called *measurements*) are presently given for the following measurement types:

`CEL`	Ultraviolet photometry from *Celescope*
`GCRV`	Stellar Radial velocities
`GEN`	$UBVB_1B_2V_1G$ photometry in Geneva photometric system
`GJ`	Absolute magnitudes and spatial velocities of nearby stars.
`Hbet`	H_β index (used in connection with Strömgren's uvby photometry)
`HGAM`	H_γ equivalent width
`IRC`	KI photometry from *Two Micron Sky Survey*
`JP11`	$UBVRIJKLMNH$ 11-colour Johnson's photometry
`MK`	Stellar spectral classification in Morgan-Keenan system
`PLX`	Trigonometric parallaxes
`pm`	Proper motions (in 1950 equatorial frame)
`pos`	Equatorial positions
`ROT`	Rotational velocities ($V.\sin i$)
`RVEL`	Radial velocities of extragalactic objects (quasars and galaxies)
`SAO`	Positions and proper motions from SAO catalogue.
`TD1`	Ultraviolet magnitudes from *TD1* experiment
`UBV`	UBV photometry in Johnson's photometric system
`uvby`	Photometry in Strömgren's photometric system
`V*`	Data related to variable stars
`z`	Redshifts (of distant galaxies and quasars)

For each type, one can retrieve individual data with their bibliographical references, and, when available, weighted means computed from existing observed values by specialists in each data type.

A description of measurement types presently included in Simbad is given in Appendix F.

14.4 Bibliographical references

Bibliography includes references to all published papers from the journals regularly scanned (currently about 85 titles; the list is given in Appendix G).

Articles are scanned in their entirety, and references to all objects mentioned are included in the bibliography.

14.4.1 Coding system

The *SIMBAD II* bibliographical reference code (such as `88..1234`) is now replaced by a new coding system defined in cooperation with the staff of NASA/IPAC Extragalactic Database (NED), at IPAC. Reference codes have the following structure:

YYYYJJJJJVVVVMPPPPA

where:

YYYY	Year of the publication.
JJJJJ	A standard abbreviation for the journal.
VVVV	The volume number (for a journal) or one of the following abbreviations for another publication: B book, C catalogue, P preprint, R report, T thesis
M	Specific qualifier for a paper: L letter, P pink page, 1-9, A-K fascicule number, Q-Z article number in the page
PPPP	The page number.
A	The first letter of the name of the first author (or ':' if uncorrect or incomplete coding).

There are some exceptions to these rules, but they are of minor importance.

Example: `1991A&A...246L..24M` for `Astron. Astrophys., 246, 24, 1991 (L)`, a letter to the Editor of A & A, by Motch et al.

14.4.2 Updating

The bibliography is reasonably complete back to 1950 for stars, but only to 1983 for non-stellar objects (although many earlier papers are included for certain objects).

The updating of SIMBAD is a continuous daily process performed through a collaboration with the Institut d'Astrophysique de Paris and the Paris and Bordeaux observatories. The

bibliographers in Paris, Strasbourg, and Bordeaux input directly to SIMBAD from journals as they are received in the libraries. It is therefore highly probable that the references are completely up to date.

14.4.3 Query by bibliographical reference code

It is possible to obtain the complete bibliographical reference, from the reference code, by typing it in answer to the `simbad search ->` prompt.

A reference code can be supplied without indicating all the fields: the first reference corresponding to the truncated code will be displayed. However, at least three digits are needed.

It is also possible to submit old SIMBAD II reference codes: truncated references can also be written, provided they contain at least three characters. For such queries, the new reference code is also given in return.

Chapter 15

Managing an astronomical object

You will interact with an *astronomical object* agent in several circumstances:

As a result of a query by identifier, the database sets as current context the queried astronomical object, which is ready to be displayed.

After a sample, when you ask the *object list* agent to display a specific object, this object will come in front of you, as a new agent.

You can also *keep* an object and refer to it at any moment during the session.

An *astronomical object* agent has a name related with its origin.

After an interrogation by identifier, the agent receives the name of the identifier used to query it, for example: `[HD 9902]`.

In an object list, the *astronomical object* agent has the name of the *object list* agent, followed by the number of the object in the list.

If it is a kept *astronomical object* , the name may be given by yourself in the *keep* command.

An *astronomical object* agent knows the following actions:

display Such a command displays the astronomical object according to the current format (defined by the environment variable FM-STANDARD, see chapter 18: "Defining formats"). By default, a very general format displaying all data is proposed.

The *display* command accepts, as parameters, names of format entries. This allows you to get specific data displayed as long as you interact with the *astronomical object* agent.

The standard format provided by the system (see chapter 18) has the following entries:

basic	basic data: object type, coordinates, magnitudes, spectral type (or morphological type), proper motions (or dimensions for galaxies)
id	identifier list (aliases)
data	observational measurements
cat	measurements from catalogue *cat* (example: `UBV` or `SAO`
all	all the observational measurements
ndata	displays the number of observational measurements
bib	bibliographical codes and text.
bibcode	bibliographical codes. Displaying only the codes is useful when you have a long list of objects, having often common references. Each displayed reference code is put in a *reference list* agent, and this list will be displayed once automatically at the end of the session. It can be also displayed at any moment by typing **reftext** —a macro command asking *display* to the reflist agent.
nbib	lists the number of references (in the range set by the BIBYEARS variable).

keep To keep the astronomical object in the session. If you do not keep it, it will be replaced by the next one accessed.

Adding a name to the command will change the current name of the agent.

bye To leave the *astronomical object* agent.

Chapter 16

Sampling and defining filters

Sampling consists of interrogation of the data bank according to the specific criteria you define. Objects are selected according to these criteria and a list of selected objects is presented. Sampling is done in two steps:

- First, you need to choose a name (*filtername* in the following) and create a *filter* agent containing the sample criteria written as a set of instructions. Such *filters* can be kept from one session to another. So, if the filter already exists, you need just to load it into the session.
- Then, you send a command to `simbad search ->` with the filter name as parameter, preceded by a quote character (as explained in chapter 7).

The sample results are managed by an *object list* agent (described in chapter 17).

16.1 Defining a filter

You get access to an existing filter, or define a new one, through the following command:

session use filter *filtername* where *filtername* is the name of the filter you want to use for sampling the database.

After this command, if the filter named *filtername* already exists, it becomes available in the session, for modification (through "*filtername* **set** ") or immediate use in a query ("**database search** '*filtername*").

If no filter agent exists under the name *filtername*, a new one is created, and the command "*filtername* **set** " is automatically invoked to allow defining the sampling criteria. This can be done on a line-by-line mode (entering the criteria one after the other, at the `filtername set ->` prompt) or through a text editor, by pushing the [CR] key as an answer to the prompt. Usage of the text editor is described in chapter 25.

16.2 Writing filtering instructions

A filtering instruction corresponds to one criterion. Each criterion comprises a keyword and parameters, generally made of a lower limit and an upper limit or some name.

Example: `MB 6.5/9.0`

`DATA SAO`

Criteria can be combined in the following way:

- Criteria written on different lines correspond to the `AND` operator:

  ```
  MB 6.5/9.0
  DATA SAO
  ```

  Select all objects having magnitude B between 6.5 and 9.0 **and** having SAO data.

- Criteria written on one line separated by a '`|`' character correspond to the `OR` operator:

  ```
  MB 6.5/9.0 | MV 6.0/8.5
  ```

  Select all objects having B magnitude between 6.5 and 9.0 **or** V magnitude between 6.0 and 8.5.

- The `!` character is a `NOT` operator for the criteria concerning basic data other than coordinates, and for catalogues and measurements:

  ```
  DATA !UBV
  MB !6.5/8.0
  ```

  Select all objects which do **not** have UBV data, and with B magnitudes which are **not** in the range 6.5 to 9.0 mag.

Any number of instructions and criteria may be written in one filter. The total size of the resulting sample is not limited.

All available instructions for defining a filter are described in the next section.

16.3 Sampling criteria

These descriptions make use of the following conventions:

RADIUS	An underlined word is a keyword and must be written like it is given
$\left\{ \begin{array}{c} C \\ CG \\ CE \end{array} \right\}$	Represents an alternative. Only one of the terms must be chosen
C	Is a default value: if you choose it, you don't need to type it (example: the letter C — for equatorial coordinates — in the CIRCLE or FIELD criteria)
[n]	Shows an optional parameter

16.3.1 Criteria concerned with coordinates and fields.

Note: In general a set of criteria should include some limitations in coordinates. These limitations allow to define a range of coordinate boxes which includes the requested area: all the objects from these boxes are read and checked against the whole set of criteria. SIMBAD has been divided for that into small regions allowing an optimized access by coordinates.

When a set of criteria includes no limits in sky position, the complete database is to be scanned.

CIRCLE $\left\{ \begin{array}{ccc} C & \alpha & \delta \\ CG & \ell_{II} & b_{II} \\ CE & lon & lat \end{array} \right\}$ RADIUS radius

Retrieves all objects in a circle defined by the coordinates of the center and the radius (in degrees). The equinox is defined by the filter criterion EQUINOX, see below (default: 1950.0).

Example:
CIRCLE 12 30 +75 10 RADIUS 4 30
CIRCLE CG 120.3 -43.0 RADIUS 6

FIELD $\left\{ \begin{array}{ccc} C & \alpha & \delta \\ CG & \ell_{II} & b_{II} \\ CE & lon & lat \end{array} \right\}$ DIM long/lat

Retrieves all objects in a rectangle defined by its center and full dimensions (in degrees). The equinox is defined by the filter criterion EQUINOX, see below (default: 1950.0).

Example:
FIELD 0 15 -00 0 DIM 5/5

EQUINOX *year*

Changes the value of the equinox used in criteria CIRCLE and FIELD. Use it only if you

want to modify the default value (1950.0). It can be written as a decimal number, and should be given before the CIRCLE or FIELD criteria.

Example:
EQUINOX 2000.0

RA α_0/α_1

Defines limits in right ascension at equinox 1950.0.

Example:
RA 12 30/14 00

DEC $\delta_{min}/\delta_{max}$

Defines limits in declination at equinox 1950.0.

Example:
DEC -02/+03

16.3.2 Criteria concerning other basic data:

MB B_{min}/B_{max}

Limits in B magnitude. They can be given with a precision up to 1/100.

Example:
MB 0/6.5

MV V_{min}/V_{max}

Limits in V magnitude. They can be given with a precision up to 1/100.

Example:
MV 8.31/8.75

B-V $B-V_{min}/B-V_{max}$

$B-V$ limits. They can be given with a precision up to 1/100.

Example:
B-V 0.2/0.5

PM lower/upper

Total proper motion limits: $\mu = \sqrt{\mu_\alpha^2 + \mu_\delta^2}$. The units are arcsec/yr.

Example:
PM 0.1/1.0

SP min/max spectral type

Limits in spectral types. The specified limits refer to three independent values: temperature class, luminosity class and peculiarities. See also: SPT & SPL criteria. The way spectral types are coded in SIMBAD is described in an Appendix.

Example:
SP F0I/G5III

SPT min/max temperature class

Limits in temperature class. This specialized criteria can be manipulated more easily than the general one *SP*.

Example:
SPT B5/A9

SPL min/max Luminosity class

Limits in luminosity class.

Example:
SPL Ia/II

OBJECT object type

Selects according to the object type. Possible values: `*, G, ?, G*`: for star, galaxy, nonstellar object, and star in external galaxy.

Example:
OBJECT G

16.3.3 Criteria concerning catalogues and measurements:

CAT catalogue name

Selects objects only when they have an identifier in the specified catalogue.

Example:
CAT HD | SAO | GC

DATA measurement name

Select those objects which have measurements in the specified catalogue.

Example:
DATA UBV

16.3.4 Criteria concerning bibliography

BIB $year_{min}/year_{max}$

Selects objects having references in the specified limits.

Example:
BIB 1985/1990

16.4 Submitting the sampling query

This is made by sending to the agent *simbad* the name of a previously defined filter. The name should be preceded by a quote ('). The reason for that was given in the chapter 7: "How to create a list of objects".

Your command will look like:

```
Simbad search -> 'filtername
```

Example: You have prepared a filter named **calib** and containing the following instructions:

```
FIELD  18 35.2  +38 44  DIM 5/5
MV  6.5/9.0
DATA UBV | uvby
```

You submit it by replying:

```
Simbad search -> 'calib
```

to the main prompt. A list of the astronomical objects belonging to the given field, and fulfilling the other specified criteria will be generated.

Sampling generates an *object list* agent. It is available after the sampling command for displaying objects, be saved, etc. How it works is described in the chapter 17: "Managing an object list".

Chapter 17

Managing an Object list

A SIMBAD query resulting in a list of retrieved objects generates an *object list* agent which remains available after the query.

This *object list* can be used temporarily, for the duration of the session, to display the individual objects it contains. Different ways of displaying are available. The list can also be kept from one session to the other, and maintained as a list of interesting objects. You can add individual objects to such a list, merge different lists generated independently, and perform several other functions.

These *object list* agents have an automatic or explicit naming convention.

17.1 Object list naming convention

When making a query which generates an object list, if you do not specify a name for the *object list* agent, it will be automatically named according to the following system: the nth list generated within a session is named:

database_name `-list` n (ex: `simbad-list1`).

All agents with such names are destroyed at the beginning of the following session.

You can give an explicit name to an *object list* agent by two ways:

1. specifying an object list name when submitting the filter query:
   "simbad search *filtername objectlistname"*
2. or further during the session, by renaming the agent:
   "object_list **name** *newname"*

Object list agents having such names are kept from one session to the other.

17.2 Displaying an object list

The command "*object_list* **display** *parameters*" allows to display the objects contained in an object list.

There are three possible parameters:

all to display all astronomical objects using the current format

n to display object #*n* in the list.

+*n* to display *n* objects from the current one in the list

17.3 Object list operations

Note: *The features of this section are not yet available.*

You can perform several operations on *object list* agents:

"*objlist* **add** *astrobject*"
"*objlist* **del** *astrobject*"
"*objlist1* **and** *objlist2*"
"*objlist1* **or** *objlist2*"
"*objlist1* **not** *objlist2*"

17.4 Managing an object list

Note: *The features of this section are still under development.*

Several commands allows you to manage an object list:

"*objlist* **describe** "
"*objlist* **kill** "
"*objlist* **set comment** *text*"
"*objlist* **name** *newname*"

Chapter 18

Defining formats

All output presentation for data, on screen or on file, are defined through *format* agents.

During a session, three differents formats are used in three different circumstances:

- An immediate format.
  It is used for the immediate output when an object is accessed by identifier or by its number in an *object list* .
- A standard format.
  This format is used while querying data related to a retrieved astronomical object through the command "*astrobj* **display** ". It may contain named sub–entries which can be given as parameters to the command.
- A list format.
  Which is used for brief displaying of object list (one line per object), through the command "*objlist* **display all**"

The software provides default formats for these three usages. As long as you are satisfied with them, you don't need to read the remainder of this chapter.

18.1 Getting your own formats in the session

Defining and using your own formats in SIMBAD is made through the following steps:

1. Create or acquire a new format.
   There are two ways of doing this:
   - The command
     "**session use format** *formatname*"
     loads an existing format with the given name. If none exists, then a *format* agent with this name is created, you receive the prompt `format-name set ->` and you may write the format instructions (see 2.).

- The command

  "*formatname* **clone** *new_name*"

  copies an existing format (a default format or a format you have created; in this case it must be loaded in the session by the previous command), allowing you to modify it, rather than writing all instructions from scratch. With this command, you will be able to copy in your own environment the default formats and edit them.

2. Write instructions or edit the format.

   This is done through the command:

   "*formatname* **set** "

   You can then choose to enter the format instructions on a line-by-line basis (as answers to the `formatname set ->` prompt) or enter the editor (see chapter 25) by first pushing the [CR] key. This will allow you to display, write or edit the instructions for the format. Note that the last instruction of your format should be: FIN.

3. Make the format available to use.

   Even when loaded in the session, and having its instructions, a format is still inactive: dozen of formats can be present in the session, the programme needs a way to know which one it should use.

   This is done through environment variables. Three variables define the formats to use in the three different cases defined above. They are:

FM-IMMEDIATE	for the immediate format used when accessing an object
FM-STANDARD	for the standard format used by "*astrobj* **display** "
FM-LIST	for the format used for lists in tabular form

   You can check the current value of these variables by asking the *env* agent to display its variables (chapter 19):

   "env display "

   And you will find, among other variables[1]:

   ```
   FM-IMMEDIATE="fm-immediate"
   FM-STANDARD="fm-standard"
   FM-LIST="fm-list"
   ```

   To link your own format to one or several session formats, you need to redefine the corresponding environment variables by the command:

   "env set *VARIABLE = yourformat*"

[1] The names of the variables (FM-IMMEDIATE, FM-STANDARD, FM-LIST) are typed in upper case letters. The names of the default formats are the same names, but written in lower-case letters.

where *VARIABLE* may be any of the environment variables described above[2].
From this moment on, your format will become active when needed.

4. Make the format change permanent
We have described how to define new formats and make them available to the session. But, while the format file will be kept from one session to another in your directory, it will be replaced by the default formats at the beginning of a new session, unless you modify your user command file. This file contains commands which are executed at the beginning of each session, before you receive the first prompt (it is equivalent to a `login.com` file on VMS, a `.login` or `.profile` file on UNIX for instance).
You have access to this file, for editing, through a command addressed to the *user* agent (see chapter 22). The name of your user agent is *your username*:
"*username* **set cmdfile**"
which calls the text editor.
To make a format permanently available, you need to enter the following commands[3]:
```
/session use format yourformat
bye
/env set FM-IMMEDIATE=yourformat
```
to change the immediate format for instance. You can of course change all formats.

18.2 How to build a format

Formatting instructions are written using an embedded text editor inside Simbad software. By default, this editor is the *vi* UNIX editor (see chapter 25).

Formatting instructions are written in the order you want the data to appear. Maximum line length will drive line skips where skips are not explicitly specified.

There are two kinds of formatting instructions.

- **data instructions:** These instructions trigger the displaying of some data: COO for coordinates, MES for measurements, etc.
- **presentation instructions:** They are concerned with the disposition of data on the output: SKIP to skip lines, TEXT to insert some general text and so on.

A formatting instruction consists of four parts:

1. **Instruction name**
This name defines the instruction, like COO, TEXT, SKIP, etc... The complete list is defined below.

[2]We recommend using upper-case letters for the variable name and lower-case letters for the format name

[3]The '/' character allows to address a command to an agent —session or env, here— without making it the current agent; the bye is an answer to the prompt '`yourformat set ->`' generated by the 'session use'

2. **General presentation parameters (gparm)**
   Enclosed in parenthesis, these parameters have the following syntax:
   `(output-length, ["introduction text"])`
   The `output-length` is used to give a fixed length to the displayed data. Otherwise, the length will be adjusted to the length of the data. This is especially useful for table output.
   The `introduction text` will be written in front of the corresponding data.
   This part of an instruction is optional.
3. **Specific parameters**
   These parameters depend on the instruction and may have different syntaxes. They will be described for each instruction later on.
4. **Subfield definition (subfields)**
   This part of an instruction allows you to select fields in the data. You need of course to know exactly how the data is usually displayed to be able to select the right fields. An appendix and on-line help gives you templates for each data type.
   Subfield definition has the following syntax:
   `(pos,lg[,text]  pos,lg[,text]  ...)`
   As many subfield as you want can be defined. Text should be within quotes. The order can be modified and fields can overlap. Each field is defined by its position `pos` and its length `lg`. `text` is optional: if present, it will be displayed after the subfield.
   Don't use this instruction element if you want the whole data.

Alternative displays:

You can define in a format alternative data to be displayed if one is absent. This is done by writing the different instructions separated by '`|`'.

Examples:

You want to display in a file stars and galaxies. The first have proper motions, the later have dimensions. You can display these informations in a same column by writting the instruction:

```
PM (24) | DIM
```

You want a column with one identifier: HD if it exists, SAO if not, V* if nor HD, nor SAO exist, and at last, if none of all them exists, the first identifier present. This can be done with the instruction:

```
ID HD | SAO | V* | 1
```

The following paragraph will contain the complete list of formatting instructions. For each of them, you will find the complete syntax and the description of the specific parameters. An example will also be given.

18.3 The formatting instructions

Presentation instructions

SKIP [n]

Skip n lines. The default is skip to the next line.

Example:
SKIP 3

TEXT "*text*"

The text will be written at the current position. The example shows how to separate columns by a vertical line in a table output.

Example:
TEXT "|"

IC 'c' n

Insert the specified character c, n times. Use the example to draw an horizontal line 80 char. wide.

Example:
IC '-' 80

FIN

Finish the formatting programme. This must be the last instruction. It has no parameters.

Example:
FIN

comment line

This line is a comment line available, for your own use, in the format file. The **COM** keyword has the same effect.

Example:
This is my first format !

LLG *length*

Defines the size of the output record (maximum value: 1000). The default value is 80 characters.

This can be used when creating an output file with the '>' special command (see chapter 21).

Example:
LLG 132

18.3.1 Data instructions

OBJID [gparm]

Display a general identifier for the astronomical object. It depends on the origin of the object: If it comes from an interrogation by identifier, then it is the identifier which has been given as a search key. If it comes from a list, then it is the sequential number of the object in the list.
In the following example we leave 10 characters for displaying the object identifier.

Example:
OBJID (10)

ID [gparm] $\left\{ \begin{array}{cc} & A[*] \\ & 1 \\ catname & [+]\ [\ \mathbf{N}{=}nb] \end{array} \right\}$

Display identifiers. The options are:

- **A [*]**
  Display all identifiers, with a tabulation value of 25 columns. An appended '*' suppresses tabulation, and provides a more compact display.
- **1**
  Displays the first identifier, independently from which catalogue it comes.
- *catname* Displays the identifier from the specified catalogue.
  N = *nb* may limit the number of occurrences of ids from this catalogue, in exceptional cases when several identifiers from the same catalog do exist.
  + generates right justification of the identifier.

Example:
ID A
ID HD "|" SAO "|" NGC

COO [gparm] $\left\{ \begin{array}{c} Q \\ G \\ E \end{array} \right\}$ [*equinox*] [*precision*]

Equatorial (Q) —default value— Galactic (G) or Ecliptic (E) coordinates.
The default value for the equinox is 1950.0. It can be written as a decimal number.

The precision is a code which can have the following values:

code	definition
0	1 ^{o}
1	1/10 ^{o}
2	1 '
3	1/10 '
4	1 "
5	1/10 "
6	1/100 "
7	1/1000 "

If not specified, the precision will be the one associated with the coordinates in the database. The letter **p** instead of a code generates the display of the SIMBAD precision code, within parentheses.
A precision code followed by a '!' force the coordinates to the given value even if it is smaller in Simbad.

Example:
COO (27,"Eq. coord = ") Q 1990.0 4
COO (27) 1950.0 5!

MAG [gparm] [subfields]

Displays the magnitudes contained in the basic data field.

Example:
MAG (8,"mb=") (1,6) ... will display MB on 8 chars

PM [gparm] [subfields]

Displays the proper motions contained in the basic data field.

Example:
PM (20)

DIM [gparm] [subfields]

Displays the dimensions of galaxies contained in the basic data field.

Example:
DIM (20)

SP [gparm] [*length*]

Displays the spectral type stored as basic data.

length defines the number of bytes that are displayed. Most of the spectral types need less than 5 chars, but this field can be as long as 36 chars. Default length is 10 chars. A different value can be given in the *gparm* field in the sense that you can display 10 chars of a spectral type in a 20 char. wide column.

Example:
SP 15

MT [gparm] [length]

Displays the morphological type of galaxies.

Same syntax as **SP**.

Example:
MT 10

OBJECT [gparm] [E]

Displays the object type (star or galaxy) as follows: $*$ (star), G (Galaxy), G$*$ (star in external galaxy), or ? (other non-stellar object).

The **E** (Extended) option displays the object type as a full word (star, galaxy).

Example:
OBJECT (2)

MES [**gparm**] $\left\{ \begin{array}{c} A \\ cat \end{array} \right\}$ $\left\{ \begin{array}{c} F \\ M \\ A \\ N \end{array} \right\}$ [**H**] [**B** [*y1* [,*y2*]]] [**subfields**]

Display measurements. The different options are:

- First option $\left\{ \begin{array}{c} A \\ cat \end{array} \right\}$ **A**ll catalogues, or the one specified by its name. The standard formats use here the environment variable **MESCAT** (default value: **A**).
- Second option $\left\{ \begin{array}{c} F \\ M \\ A \\ N \end{array} \right\}$ To select **F**irst, **M**ean or **A**ll measurements, or give the **N**umber of measurements. If no mean value exists, the first measurement is

displayed. The standard formats use here the environment variable **MESTYP** (default value: **A**).

- Third option [H] To print the column **H**eaders.
- Fourth option [B [*y1* [,*y2*]]] To display the bibliographic text immediately, and eventually restrict the one displayed by limiting the year range (*not yet implemented*).

Example:
MES PLX A
MES MESCAT MESTYP H

REF [gparm] $\left\{ \begin{array}{c} \# \\ nb \\ T \end{array} \right\}$ [*y1*,*y2*]

Display bibliographical reference information according to the following options:

- #
  displays the number of references.
- *nb*
  displays *nb* reference codes by line.
  These codes are collected by a *reference list* agent for which a command *display* will display, but only once for each code, the reference test. This is automatically triggered at the end of a session.
- **T**
  displays immediately the text for each reference.
- [*y1*,*y2*] Limits the display to the specified year limits.

Example:
REF T

Chapter 27 gives the full printout of the three main default formats. These formats can be used as templates.

18.3.2 Example

In the following example we will produce a format giving, in one line per object, a selected identifier, coordinates in a unified format (to the tenth of arcsec.), magnitudes and object type. The identifier will be chosen in the following catalogues (in that order): HD, BD, CD, CPD, V*, NGC, IC, or the first one appearing in the database.

In order to create the above format as **ff**, and replace the default (immediate) format by this one, the following command sequence can be used:

```
simbad search -> /session use format ff
ff set ->
```
here, type [CR], then **i** *for input mode, then enter the text of the format:*

```
ID(20) HD|BD|CD|CPD|V*|WD|GD|NGC|ID IC|1
TEXT "|"
COO (27) 1950.0 5! | IC ' ' 27
TEXT "|"
MAG (16) (1,16," ") | IC ' ' 17
TEXT "|"
OBJECT (2)
FIN
```

type [esc] then **:wq** *for leaving the editor*

```
ff set -> bye
simbad search -> /env set FM-IMMEDIATE=ff
```

Interrogating Simbad for one object we get the following output:

```
simbad search -> HR 5999
HD 144668           |16 05 12.78  -38 58 22.7   | 7.41    7.05|*
```

Chapter 19

Environment variables

The software uses a certain number of general parameters, which are made available to the user through environment variables.

These variables are maintained by an agent called *env* . Actions that can be asked to it are: *display* to get the list of the currently defined variables and *set* to define a new variable or modify an existing one.

The command **"env display "** gives the following display, showing the default values of all system defined variables:

```
BIBYEARS = "1850/1992"
COOEQUINOX = "1950.0"
COORADIUS = "0 10"
EDITOR = "vi"
EQUINOX1 = "1950.0"
EQUINOX2 = "2000.0"
FM-BIBLIOGRAPHY = "fm-bibtxt"
FM-IMMEDIATE = "fm-immediate"
FM-LIST = "fm-list"
FM-STANDARD = "fm-standard"
MESCAT = "A"
MESTYP = "A"
```

You can modify all these variables. You can also have them permanently modified by writing the corresponding commands in your user command file. This is described in the section "Getting your own formats" of the chapter 18: "Defining formats".

You can also create new variables (to be used in your own formats for instance).

Here is a short description of these variables (for more information use the index at the end of this User's Guide):

BIBYEARS	Used in default formats to set up the limits of years when displaying the bibliography.
COOEQUINOX	Equinox of input coordinates in query by coordinates
COORADIUS	Radius used in query by coordinates (degrees)
EDITOR	Editor used for format, filter or user command file editing
EQUINOX1	First equinox. This variable is used by all default formats
EQUINOX2	Second equinox. This variable is used to display a second set of equatorial coordinates in the default standard format
FM-IMMEDIATE	Immediate format definition (see chapter 18)
FM-LIST	List format definition
FM-STANDARD	Standard format definition
MESCAT	Measurement catalog(s) to display. This is a variable used by the default standard format (see chapter 18
MESTYP	Type of measurement to display. This is a variable used by the default standard format

These variables can be used inside a format (or filter): an example is MESCAT and MESTYP, used in the `fm-standard` default format. In this case, if you modify these variables using the command **"env set VAR=***value"*, the format itself (for instance `fm-standard`) will not be immediately modified, unless you type the command **"format compil "**. And that would have to be done for each format using that variable.

In this case, we recommend to use the command **"session define agent-class** *variable=value***"** which modifies the corresponding environment variable **and** recompiles all formats or filters present in the session.

Chapter 20

The session

The *session* agent manages the interaction between the user and all other agents in the programme.

1. **For ending the session:** You have to ask the *session* agent to *exit* :
   "session exit "
   This can also be done by typing **stop**.
2. **For accessing or creating new agents in a session:**
   This is done through a command like:
   "session use *agent-class agent-name"*
   The agent classes for which such a command is available are:

database	to have access to another simbad-like database
format	to load or create a new format agent
filter	to load or create a new filter agent
objlist	to recall a previously created object list

3. **For modifying format or filter variables**
   Formats and filters can contain environment variables (chapter 19) such as: MESCAT, MESTYP, etc. If you modify these variables using the command **"env set VAR=***value"*, the format itself will not be immediately modified, unless you type the command **"format compil "**. And that would have to be done for each format using that variable.
   The command **"session define** *agent-class variable=value"* modifies (or creates) the corresponding environment variable and recompiles all formats or filters present in the session.

Chapter 21

Managing the user interface

The user interface (*uif*) agent is used for managing the input/output aspects of SIMBAD. It is based on Proteus/Termwindows, an uif toolbox for input/output softwares, developed at ESO and ST-ECF (Garching).

This agent (*still under development*) presently provides two modes of input/output:

1. **a line-by-line (tty) mode** which can be used on any kind of terminals. It allows line by line prompting and answering. Every display is done line after line. This is presently the default value.
2. **a full-screen mode:** which makes use of the Proteus/Termwindows tools. Prompts, data displays, error displays, auxiliary information display, are done on different independent windows.

It is possible to change the input/output mode, but also to modify the source of the input (either terminal keyboard or file) and the output (screen or/and file).

The page display mode (either page by page (20 lines) or continuous) can also be controlled.

The user interacts with the *uif* agent with two verbs: *bye* (standard), and *set* . The command **"uif set "** accepts the following parameters:

screen: This parameter has the possible values : **simple**, **usual** (may be abbreviated as **s** and **u**) which select respectively the tty and full-screen mode.

The same result can be obtained with the macros (see chapter 24: "Macro language"): **tty** and **full**.

screenoutput: this parameter has two possible values **yes** or **no**. The command **/uif set screenoutput yes**, emulated by the macro **displayed** allows output on the screen (default value). The command **/uif set screenoutput no**, emulated by the macro **undisplayed** stops the screen display (this is something you may wish to do in order to save time while storing the results from Simbad into a log file —see chapter 10). The '/' character used in the macro instruction allows to send a command to an agent without

making it the current agent (and thus staying, for instance, at the `simbad search ->` prompt).

fileoutput: This parameter has two possible values **incre** and **decre** and requires an additional parameter: *filename*.

The command **/uif set fileoutput incre file1.dat** emulated by '**> file1.dat**' opens the file `file1.dat` and forces the output to be directed in this file. Actually, the effect of the > macro command is also to stop the output on the screen.

The command **/uif set fileoutput decre** emulated by >| closes the last file opened. These commands can be nested (a pile of output files is managed). The effect of >| is also to redirect the output on the screen.

An important example is the use of these commands for managing a log file of name `simbad.log` through the macro commands:

log	keeps a log of the session in a file 'simbad.log'
sendlog *user@node.domain*	sends the log file through e-mail (Internet)
sendlog *node::user*	(or SPAN/Decnet)

The **sendlog** instruction closes the file, before sending it to the mailer.

inputfile: This parameter has two possible values **incre** and **decre** and requires an additional parameter, "*filename*".

The command **/uif set inputfile incre file1.com** forces the commands to be read in the file `file1.com`. It can be emulated by < **file1.com.**.

The command **/uif set inputfile decre** stops the reading of the commands in the last opened input file. It can be emulated by <| or forced by the end of the input file. These commands can be nested.

page: This parameter has two possible values:

yes (the default value) generates an output display page by page, with the question:
`Do you want to see more ?`
being prompted after 20 lines (to which you can answer: **y**es, **n**o, or **c** —this last ones generating the continuous mode).

no generates a continuous display (recommended when you are having a log file, see chapter 10).

These commands are emulated by the following macros:
/uif set page yes by the macro **page**,
/uif set page no by the macro **cont**.

Chapter 22

The user Agent

The *user* agent allows to manage and display various parameters associated to the current user: full name, address, creation date, privileges, etc. It is possible for a user to interact with his user agent (whose name is the simbad *username* of the user) with the following verbs: *display* , *modify* , *write* , *set* , *bye* .

bye: has the standard effect (leaving the agent).

display: This verb displays all the information related to the user (*no effort has been made yet to fill these fields; this will come, hopefully one day*).

modify: This verb allows to modify data related to the user. It accepts the following parameters :
U for username
P for password
S for Span address
P for PSDN address
E for EARN/Bitnet or Internet Address
A for postal address

These parameters are to be followed by the new value.

Example : **A007BOND modify S cdsxb24::james** will change the SPAN address of the Simbad user A007BOND into cdsxb24::james.

write: Saves the (eventually) modified user characteristics in the user file.

set: With this verb and the **cmdfile** parameter, you can edit and modify your `user.cmd` file. This is important, because it allows you to store customized default formats and parameters. In the following example we show how to modify the default value of the equinox of coordinates from 1950 to 2000[1]:

`simbad search ->` *username* **set cmdfile**
`username set ->`

[1] The '/' character used in the macro instruction allows to send a command to an agent without making it the current agent

here, enter the following text:

```
#  The default equinox will be 2000
/env set COOEQUINOX = "2000.0"
equi1  2000.0
equi2  1950.0
```

type [esc] then **:wq** *for leaving the editor*

```
username set -> bye
```

Chapter 23

The internal Mail facility

A *mail* agent manages the messages between the CDS and the user. This comes as a complement to the standard way of sending a message (through electronic mail to `question@simbad.u-strasbg.fr` or `simbad::question`. For sending back files to or from your home computer see chapters 8 and 10).

The user can interact with the *mail* agent with the verbs: *send* , *read* , *save* , *bye* .

send:
This verb allows the user to send a line of message to the CDS. After the first line, type [CR] for a second line and so on. To finish the input of the mail and send it effectively it is necessary to type **bye** at the beginning of a line.

read:
This verb allows the user to read a message from the CDS or to be informed that there is no message.

save:
This verb allows the user to save the content of the message from the CDS in a file, the name of which can be chosen.

bye:
This verb has the standard effect, except after *send* when it sends the mail effectively to the user, before producing the standard effect.

Chapter 24

Macro language

The macro language is a feature that allows expert users to define their own commands in SIMBAD, generally by combining several basic commands.

It uses a simple mechanism of text substitution during command analysis. By this way, it is even possible to completely modify the standard mode of querying Simbad and interacting with the agents.

Every command is made of a succession of words separated by spaces. During parsing of a command, the system looks for words corresponding to a macro definition. If such a definition exists, the word in the command is replaced by the definition of the macro. Moreover, if the macro is defined with parameters, the words following the macro name in the command are used as parameters.

These macros are maintained by an agent called *macro* . It is of the same agent class than the *env* agent. So the same actions are available: *display* for displaying the list of existing macros and *set* to modify an existing macro or create a new one.

Let us first see some examples:

- By defining:
  "macro set stop = session exit"
  you may modify the ordinary way of quitting a session: you can now type *stop* , rather than typing the complete command **"session exit "**
  This is an example of macro without parameters.
- You want sometimes to modify both the list format and the immediate format. This needs normally two commands:

  ```
  env set FM-IMMEDIATE = myimmformat
  env set FM-LIST = mylistformat
  ```

  You can simplify these commands by defining the following macro:

  ```
  macro set myformats = "/env set FM-IMMEDIATE = $1 ; -
                         /env set FM-LIST = $2"
  ```

And then use your command at any moment during a session:

```
myformats myimmformat mylistformat
```

Some comments:
The macro is written like simple commands would be written. Parameters which will be given at execution time are replaced by $n, where *n* represents the n*th* parameter, that means the n*th* word following the macro name at execution time. In this example, myformats will be recognized as a macro name, $1 will be substituted by *myimmformat* and $2 will be substituted by *mylistformat*.
The semi-colon (;) is a command separator, allowing to write several commands on the same line. The quotes surrounding the complete definition are needed here to avoid the analyzer to take this semi-colon in account during the macro definition.
The '/' at the beginning of each command avoids the *env* agent to stay in the current context and modify it.
The '–' character at the end of the first line is an indication that the command continues on the next line.

- You want to interrogate a certain number of objects, getting just some data given by the immediate format —eventually your own one—, but you would like to avoid having to type *bye* after each interrogation to leave the *astronomical object* agent. You can do this by defining the following macro:

  ```
  macro set look = "$$1 ; bye"
  ```

  As it is defined here, this macro must be used in conjunction with the prompt `simbad search ->`. You will then get:
  `simbad search ->` **look HD 8890**
  ... data displayed ...
  `simbad search ->` **...**
  The parameter definition in the macro is here different: Two $ indicates that all words from the n*th* one to the end of the typed command must be used as substitution for $$n. This is needed here, because we substitute an identifier which consists of a variable number of fields separated by spaces. The $n parameter definition substitutes one word separated from others by at least one space.

These three examples show you how powerful such macros can be. You can of course build your own macros and have them permanently present in your sessions by putting them in your user command file.

A certain number of macros are defined at the system level. You can see them with the command **"macro display "**. You can of course replace them by your own definitions.

`macro display ->`[CR]

```
basicdata = "/env set FM-IMMEDIATE=fm-immediate; /env set FM-LIST=fm-immediate"
bibliography = "/env set FM-IMMEDIATE=fm-refs; /env set FM-LIST=fm-refs"
bibyears = "/session define format BIBYEARS = $$1"
catalog = "session define format MESCAT = $1 ; format MESTYP = $2 ; bye ; data"
cont = "/uif set p n"
cooequi = "/env set COOEQUINOX = $1 ; /env set MAJEQUINOX = $1"
cooequinox = "/env set COOEQUINOX = $1 ; /env set MAJEQUINOX = $1"
coolist = "/session host prepcoolist $1 > coolist.tmp ; -
      /uif set i i coolist.tmp; /session host rm coolist.tmp"
cooradius = "/env set COORADIUS = $$1"
coord = "$$1 ; bye"
displayed = "/uif set s y"
equi = "/session define format EQUINOX1 = $1"
equi1 = "/session define format EQUINOX1 = $1"
equi2 = "/session define format EQUINOX2 = $1"
full = "/uif set s u"
fullhelp = "full ; /hhelp display ; tty"
help = "/hhelp display"
ident = "simbad search $$1; bye"
idlist = "/session host prepidlist $1 > idlist.tmp ; -
      /uif set i i idlist.tmp; /session host rm idlist.tmp"
info = "/session host /usr1/dbsimbad/lortet/infoless '$$1'"
infocat = "/session host grep -i \'$$1\' /usr1/dbsimbad/note_cat | more"
log = "/uif set f i simbad.log"
maxdata = "/env set FM-IMMEDIATE=fm-standard; /env set FM-LIST=fm-standard"
page = "/uif set p y"
pageno = "/uif set p N"
password = "/Session host passwd"
quit = "session exit"
stop = "session exit"
reftext = "/simbad-reflist display"
sendlog = "/uif set f d ; /session host mail $1 < simbad.log "
tty = "/uif set s s"
undisplayed = "/uif set s n"
_email = "/session host /usr/local/bin/email"
```

Chapter 25

Using the text editor

Some functionalities in SIMBAD software make use of a text editor. This concerns mainly *filter* and *format set* , and the access to the user initial command file.

Presently, the editor called by default is '*vi*'; *emacs* is also available. Your choice of the editor is defined through the environment variable EDITOR, with default value *vi*.

25.1 vi

vi is the standard editor delivered with every UNIX system. You will not find here a complete description of it, but rather a subset sufficient for its use in SIMBAD. More details can be found in the UNIX literature.

Basics

The most important thing to know about *vi* is that it has two modes:

- A command mode
  in which each keystroke is related to an action to execute
- An input mode
  in which a keystroke effectively inserts the corresponding character into your text, at the cursor position.

The second important thing to know is that most of the commands are made of *normal* characters (like `dd` for deleting a line) and that there is nothing that distinguishes command mode from input mode. So, trying to move the cursor with an action on an arrow key of your keyboard leads to curious effects, since for most terminals such a keystroke generates an *escape sequence* of several 'normal' characters.

The third important feature to remind is how to enter into the *input* mode — generally with `i` or `A` keystrokes — and how to go back to the *command* mode — always with the

⟨Escape⟩ key. If you can't find an escape key on your keyboard, you may always use ⟨*Ctrl*-[⟩.

Last, but not least, press the ⟨Escape⟩ key if you don't exactly remember what you did just before: it's always harmless. Notice also the existence of the special command *undo* (u key): it *is* useful!

Detailed Commands

Leaving the editor	
:wq⟨*Return*⟩	Save the file and Quit
:q!⟨*Return*⟩	Quit without saving your modifications
:q⟨*Return*⟩	Quit — you'll be prompted if you did not save your modifications
Changing to input mode and back to command mode	
i	Insert text *before* the cursor position
a	Insert text *after* the cursor position
A	Insert text *at the end* of the current line
o	Open a new line *after* the cursor position
O	Open a new line *before* the cursor position
⟨Escape⟩	Terminate the input mode
Scrolling	
⟨*Ctrl*-L⟩	Repaint the Screen
⟨*Ctrl*-D⟩	Scroll *Down* a half screen
⟨*Ctrl*-U⟩	Scroll *Up* a half screen
⟨*Ctrl*-F⟩	Scroll *Forward* a full screen
⟨*Ctrl*-B⟩	Scroll *Backward* a full screen
z.	Scroll to place the current line in the middle of the screen

Basic cursor moves — moving around your text — are especially important to remember, since these are used as parameters in other operations (yank, delete ...). In the following tables, the symbol ⌊···⌋ stands for a *Cursor moving sequence*.

There are several entities defined in a text: the characters, the **w**ords made of alphanumeric characters (and the underscore), the **W**ords separated by spaces, the lines, among others. For instance, `compo-site.word` is a single **W**ord made of three **w**ords.

The (⋆) symbol in the list of keys means that the command may be preceded by a repetition factor, *e.g.* `5W` to move over 5 **W**ords.

Cursor Move (⌊···⌋)	
(⋆) `h j k l`	Move the cursor n position left / down / up / right
(⋆) ⟨*space*⟩	identical to `l` (right)
`0 $`	Move to the beginning (`0`) or end (`$`) of the line
(⋆) `w W`	Move the to the next word (alphanumeric) or Word (space-separated)
(⋆) `b B`	Move the to the previous word (alphanumeric) or Word
(⋆) ⟨*Return*⟩	Move to the next line
(⋆) `-`	Move to the previous line
n`G`	Move to line number n (1 for beginning, default is *last* line)
`%`	Move to the matching bracket
‘x	Move to marker x (a letter) previously defined by mx
Search	
`/`*pattern*	Search for *pattern*
`n`	Position cursor to next occurrence of *pattern*
`N`	Position cursor to previous occurrence of *pattern*
`:set ic`⟨*Return*⟩	ignore case in forthcoming pattern searchings
Special Commands	
`u`	Undo the previous command
`.`	Repeat the last command
⟨*Ctrl*-`G`⟩	Display file name and current position
`J`	Join the current line with the next one
mx	Save in marker x (a letter) the current cursor position

Deleting, changing and yanking (copying) text can use any cursor move ($\langle \cdots \langle$) to specify the limit of the operation. The ($\star$) symbol in the list means that the command may be preceded by a repetition factor, *e.g.* `25dd` to delete 25 lines.

	Delete Text
($\star$) `x`	Delete current character (at cursor position)
($\star$) `X`	Delete previous character (left of cursor position)
($\star$) `dd`	Delete current line
`D`	Delete until end of line (identical to `d$`)
`d`$\langle \cdots \langle$	Delete until position defined by cursor move $\langle \cdots \langle$, *e.g.*
	`d3W` delete three Words
	`dG` delete until end of file
	`dn` delete until next occurrence of *pattern*
	Yank (copy) Text
($\star$) `yy`$\langle \cdots \langle$	Yank current line
`y`$\langle \cdots \langle$	Yank until position defined by cursor motion $\langle \cdots \langle$, *e.g.*
	`yG` yank from cursor until end of file
	Put (paste) Deleted or Yanked Text
`p`	Put deleted or yanked text *after* cursor
`P`	Put deleted or yanked text *before* cursor
	Substitute (change) Text
`r`x	Replace letter at the cursor position by x
`cc`	Change the current line with new text (until ⟨Escape⟩)
`C`	Change from cursor to end of line with new text (until ⟨Escape⟩)
`c`$\langle \cdots \langle$	Change text until position defined by cursor motion $\langle \cdots \langle$, *e.g.*
	`c3l` change three characters
	`cn` change until next occurrence of *pattern*

Part IV

REFERENCE MANUAL

Chapter 26

Agents and command table

Database	A database like SIMBAD	
verb	parameters	description
search	*identifier*	query the database by an identifier name.
	coordinates	query the database by coordinates, founding all objects in a small circle around the given coordinates. The radius of this circle is given by the environment variable COORADIUS.
	'*filtername*	makes a sample using the named filter.
	bib. ref. code	displays the text of the reference. The code can be given in the new format or in the old one. The reference code can be partial with at least the 3 first characters.
release		To close the data base for this session. It will no longer be available for searches, or you call it again through the command: "session use database name".
bye		To stop dialoging with this database agent. It remains in the session and can be reused through a command like "database-name search ..."

Session	Manages a session and all the agents	
verb	parameters	description
exit		exits SIMBAD software
use	*classname agentname*	requires access to a new agent belonging to the specified class.
define	*classname VARIABLE= value*	sets the value of an environment variable within a format of a filter and recompiles all the formats and filters.
release	*agentname*	tells the agent to leave the session.
echo	*text*	writes the text directly to the standard output. This is only useful in command files.
host	*text*	directs commands to the Unix shell.
bye		stops the interaction with the session agent.

astrobj	An astronomical object	
verb	parameters	description
display	basic, id, data, bib, *catalog_name*	displays the data according to the current standard format. The parameters designates format entries displaying a part of the data.
keep	[*new-name*]	keeps a copy of the astronomical object. The new one represents the same astronomical object, which can be re-used in the session.
bye		leaves the agent. It remains in the session until a new astronomical object is interrogated.

reflist	Contains the text of all displayed bibliographical references.	
verb	parameters	description
display	*y1,y2* / ?	Displays the text of the bibliographical references contained in the list. They can be limited by years and '?' allows to return only the number of available references.
bye		Stops dialog with this agent.

objlist	A list of astronomical objects.	
verb	parameters	description
display	all, n, $+n$, $-n$	displays the list of all (or only n) individual objects in the list.
set	*comment text*	Allows to write a commentary (which can be later on displayed by the describe verb).
describe		Gives details about number of objects, creation date, etc. of an object list.
release		Releases the object list from the session. After this command, it is no longer present, but can be recalled by "session use objlist name".
delete		Deletes a previously saved object list.
bye		Stops dialog with this agent.

filter	This agent controls sampling by keeping the list of criteria	
verb	parameters	description
display		Lists all the sampling criteria of the filter
set	[*filter criterion*]	Define the instructions for the filter. In batch mode, the filter will stay in memory and cannot be updated. In conversational mode, the command alone invokes a text editor to write or update the criteria list. Look in the corresponding chapters for a full description of criteria and also for the text editor commands.
clone	*newname*	Creates a new filter agent receiving the specified newname and the same set of criteria. This is useful to create a new filter agent not from scratch, but by modifying an existing one.
write	[*name*]	Writes on disk a memory filter, created through a batch file. This command is needed to be able to update it. After this operation, the filter is permanent and should not be kept in the batch file.
release		Releases a filter from the session. After this command, it is no longer available, but can of course be recalled by "session use filter name", if it was previously saved.
bye		Stops dialoging with the filter. It quits the current context, but remains available in the session.

format	Controls the formatting of all outputs	
verb	parameters	description
display		Lists all the instructions of the format
set	[*format instruction*]	Define the instructions for the format. In batch mode, the format will stay in memory and cannot be updated. In conversational mode, the command alone enters a text editor to write or update the format. Look in the corresponding chapters for a full description of formatting instructions and also for the text editor commands.
clone	*newname*	Creates a new format agent receiving the specified newname and the same set of instructions. This is useful to create a new format agent not from scratch, but by modifying an existing one.
write	[*name*]	Writes on disk a memory format, created through a batch file. This command is needed to be able to update it. After this operation, the format is permanent and should not be kept in the batch file.
release		Releases a format from the session. After this command, it is no longer available, but can of course be recalled by "session use format name", if it was previously saved.
compil		Compiles a format (to be used when new values have been assigned to environment variables.
bye		Stops dialoging with this format. It quits the current context, but remains available in the session, and can be an active format.

UIF	User interface management. Screen and file output tuning.	
verb	parameters	description
set	screen, screenoutput, fileoutput, inputfile, page	Allows to tune the parameters of the screen output: tty or full screen mode; displayed or undisplayed on screen; directed into a file; inputs from a command file; or setting the page by page mode
bye		To stop dialog with the *user interface* agent.

macro	Macro language facility	
verb	parameters	description
set	*macro-name* = *macro-def*	Defines a macro. If the definition contains some special characters, like ';', which would be interpreted by the command analyser, then it is needed to enclose the definition between quotes. Parameters are defined by $\$n$ for single words, and $\$\$n$ for all words from the nth.
display		Displays all macro definitions managed by the *macro* agent.
on		Switches macro substitution ON.
off		Switches macro substitution OFF. It is recommended to switch macro substitution off before defining new macros.
test	*command*	Allows to test macro definitions by writing a command. This command will not be executed, but substitutions will be displayed. To work properly, you need to switch substitution off before testing the command. Substitution is automatically switched ON after the test.
bye		To stop dialoguing with the *macro* agent.

user	Manages user-related information	
verb	parameters	description
display		displays data related to the coordinates of the user and data related to usage statistics of the database (*not yet implemented*.
modify	U, P, S, P, E, A	allows to modify the password and some other parameters (addresses).
set	cmdfile	opens the user command file (`user.cmd` where permanents commands setting up the user environment can be stored.
write		saves the user modified parameters.
bye		leaves the agent.

mail	Mail facility between a user and CDS staff.	
verb	parameters	description
send		Sends messages to CDS staff.
read		Reads messages sent by CDS staff.
save		Saves a mail message in a personal log file.
bye		Leaves the *mail* agent.

help	On-line help.	
verb	parameters	description
display		Displays the root of the hierarchical help.
bye		Leaves the *help* agent.

Chapter 27

Default formats

Three default formats are pre–defined:

FM-IMMEDIATE	for the immediate format used when accessing an object
FM-STANDARD	for the standard format used by **"astrobj display "**
FM-LIST	for the format used to shortly display lists

These formats are listed below:

`simbad search ->`**`fm-immediate display`**

```
#+++++++++++++++++
#.IDENTIFICATION fm-immediate.fmt
#.ENVIRONMENT    Simbad database
#.KEYWORDS       Formats in Simbad
#.VERSION  1.0   11-Feb-1991
#.PURPOSE        Describes how to edit a named astronomical object
#.COMMENTS       This script tells which parameters of a found astronomical
#                are listed. The present script displays:
#    - Basic data (with position at 2 equinoxes + gal)
#    - All identifications (aliases)
#    - Number of measurements
#    - Number of bibliographical references
#----------------
#
#       First line: type of object
#
TEXT "Type: "
OBJECT E
SKIP 1
#       2nd line: position at equinox.1, and magnitudes
```

```
#
COO ("Coord EQUINOX1 = ") EQUINOX1 | TEXT "No coord."
MAG ("       mb, mv = ") (1,18)
SKIP 1
#       3rd line: position at equinox.2, and spectral (morphological) type
#
COO ("Coord EQUINOX2 = ") EQUINOX2 | TEXT "No coord"
SP ("    sp type = ") 20 | MT ("     morph. type = ") 20 | TEXT "     ./."
SKIP 1
#       4th line: Galactic position
#
COO ("           gal = ") G | TEXT " "
SKIP 1
#       5th line: proper motions (star) / dimensions (galaxy)
#
PM ("       pm = ") | DIM ("       dim = ") | TEXT "      ./."
SKIP 1
#       Write a separation line (filled with '-')
#
IC - 78
SKIP 1
#       Next part: all identifications (indicated by the A option),
#       followed by a separation line (filled with '-')
#
ID A
SKIP 1
IC - 78
SKIP 1
#       Number of catalogued measurements
#
TEXT "Measurements:"
SKIP 1
MES (10) A N
IC - 78
SKIP 1
#       Last part: write out the number of references existing between limits,
#       followed by a separation line (filled with '-')
#
TEXT "References: "
REF # BIBYEARS
IC - 78
#       That's it, folks...
```

```
FIN
```

simbad search **->fm-standard display**

```
#+++++++++++++++++
#.IDENTIFICATION fm-standard.fmt
#.ENVIRONMENT    Simbad database
#.KEYWORDS       Formats in Simbad
#.VERSION  1.1   22-Jan-1992
#.PURPOSE        Main format (interactive answers) in Simbad
#.COMMENTS       This format is made of several parts:
# 1) basic (fundamental data)
# 2) id (identifiers, or aliases)
# 3) data  (available data)
# 4) bib     (all references)
# The list terminates normally here. Other possible requests:
# -  ndata or nmes   (number of measurements)
# -  catalogue name  (corresponding data)
# -  all (all measurements of all catalogues)
# -  bibcode (abbreviated bibliography)
# -  bibtext (all references) alias of bib
# -  nref or nbib (number of references)
#
#=========================
# basic
#=========================
#
{ basic
SKIP 1
# Type of object, option E (extended object name)
TEXT "==== "
OBJID
TEXT " ("
OBJECT E
TEXT ")"
SKIP 1
# 2nd line: position(1), magnitudes
COO ("Coord EQUINOX1 = ") EQUINOX1 | TEXT "No coord"
MAG ("     mb, mv = ")
SKIP 1
# 3rd line: position(2), Spectral or Morphological type
COO ("Coord EQUINOX2 = ") EQUINOX2 | TEXT "No coord"
SP ("    sp type = ") 20 | MT ("     morph. type = ") 20 | TEXT "     ./."
```

```
SKIP 1
# 4th line: galactic position
COO ("          gal = ") G | TEXT " "
SKIP 1
# 5th line: proper motion (stars) / dimensions (galaxies)
PM ("       pm = ",1,1) | DIM ("       dim = ") | TEXT "./."
SKIP 1
# Separate from next line
IC - 78
}
#=========================
# id (aliases)
#=========================
{ id
SKIP 1
# All identifiers (option A), and separation line
ID A
SKIP 1
IC - 78
}
#=========================
# data (measurements)
#=========================
#  Note that 2 environment variables are used:
# MESCAT  = the catalogue of data to display (A = all)
# MESTYP  = which data (A=all, F=first, M=mean).
# Use command  /env display
# to find out the meaning of these variables...
{ data
SKIP 1
MES  MESCAT MESTYP H
SKIP 1
IC - 78
}
#=========================
# bib
#=========================
#
# Complete references (option T) are listed.
#
{ bib
SKIP 1
```

```
REF T BIBYEARS
}
#
#>>>>>>> Normal END of format.
# What follows can only be executed on request
#
FIN
#=======================================
# bibcode (abbreviated list of references)
#=======================================
{ bibcode
SKIP 1
#
# 1st line = number of references
#
REF # BIBYEARS
TEXT " Reference(s) ( BIBYEARS ) :"
# Other lines = references, 4/lines (option 4)
SKIP 1
REF 4 BIBYEARS
}
FIN
#============================================
# bibtext (list of bibliographical references)
#============================================
{ bibtext
SKIP 1
REF T BIBYEARS
}
FIN
#===========================
# nbib (number of references)
#===========================
{ nbib
SKIP 1
TEXT "Number of references ( BIBYEARS ) : "
REF # BIBYEARS
}
FIN
#===========================
# nref (number of references)
#===========================
```

```
{ nref
SKIP 1
TEXT "Number of references ( BIBYEARS ) : "
REF # BIBYEARS
}
FIN
#====================================
#       ndata  (number of measurements)
#====================================
{ ndata
SKIP 1
TEXT "Measurements:"
SKIP 1
MES (10) A N
}
FIN
#====================================
#       nmes  (number of measurements)
#====================================
{ nmes
SKIP 1
TEXT "Measurements:"
SKIP 1
MES (10) A N
}
FIN
#====================================
# all   (all data from all catalogues)
#====================================
{ all
MES A A H B
}
FIN
#
#====================================
#   catalogues names
#====================================
#
{ CEL
MES CEL MESTYP H
}
FIN
```

```
#
{ GCRV
MES GCRV MESTYP H
}
FIN
#
{ GEN
MES GEN MESTYP H
}
FIN
#
        ...  etc.   (all measurement types)  ...
#
{ z
MES Z MESTYP H
}
FIN
```

simbad search **->fm-list display**

```
#+++++++++++++++++
#.IDENTIFICATION fm-list.fmt
#.ENVIRONMENT    Simbad database
#.KEYWORDS       Formats in Simbad
#.VERSION  1.0   11-Feb-1991
#.PURPOSE        Describes how to edit an astronomical object in a single line
#.COMMENTS       This script tells which parameters should be displayed
#                in a single line (typically the result of a sampling).
#----------------
#
#       List, as a table:
#  ...  sequence number
OBJID (5)
TEXT "|"
#  ...  Type of object (stellar / galaxy / other) in abbreviated form
OBJECT (2)
TEXT "|"
#  ...  Identifier: the option 1 tells to keep only the first one
#                       (order unspecified....)
ID (19) 1
TEXT "|"
#  ...  Position at equinox specified in the environment
#       Note: to change the equinox, use the command "equi1=value" or
```

```
#               session define format EQUINOX1 = value
#       which 'recompiles' the formats, instead of
#               env set EQUINOX1 = value
COO (25)  EQUINOX1
TEXT "|"
#  ...  Spectral or morphological type. Parameter is length.
SP (8) 8 | MT (8) 8
TEXT "|"
#  ...  Magnitudes B & V, separated by a dash
MAG (11) (1,5,"-" 12,5)
TEXT "|"
#  ...  Number of references between limits
REF # BIBYEARS
#
#       Note that no SKIP is required...
#       That's it, folks...
#
FIN
fm-list display ->stop
```

Chapter 28

Special commands

The following special commands, of one or two characters, allow the displaying of some special information, or the setting of some often used parameters:

System information display:	
?	invokes the context-sensitive help
&	displays the list of commands of the current agent
:	displays the list of all existing agents in the session
!	displays the stack of current agents

Prompt control:	
.	quits the last element in the current context
/	to type a command that will not remain current (temporary command)

File redirection (and batch mode):	
>	*filename*
	redirects output to the specified file
>|	stops redirection of output file
<	*filename*
	redirects input from the specified file (procedure or batch mode)
<|	stops redirection from the input file

Part V

Appendices

Appendix A

Greek letters coding

Greek letters must be written using the following abbreviations:

α	alf	ι	iot	ρ	rho
β	bet	κ	kap	σ	sig
γ	gam	λ	lam	τ	tau
δ	del	μ	mu.	υ	ups
ε	eps	ν	nu.	ϕ	phi
ζ	zet	ξ	ksi	χ	khi
η	eta	o	omi	ψ	psi
θ	tet	π	pi.	ω	ome

Appendix B

Constellation names

Constellation names (used for Bayer and Flamsteed designations of bright stars: `alf Lyr`, for variable stars: `RS CVn`, for novae: `Nova Her 1991`, etc.) must be written using the following abbreviations:

And	Ant	Aps	Aqr	Aql	Ara	Ari	Aur	Boo	Cae	Cam	Cnc
CVn	CMa	CMi	Cap	Car	Cas	Cen	Cep	Cet	Cha	Cir	Col
Com	CrA	CrB	Crv	Crt	Cru	Cyg	Del	Dor	Dra	Equ	Eri
For	Gem	Gru	Her	Hor	Hya	Hyi	Ind	Lac	Leo	LMi	Lep
Lib	Lup	Lyn	Lyr	Men	Mic	Mon	Mus	Nor	Oct	Oph	Ori
Pav	Peg	Per	Phe	Pic	Psc	PsA	Pup	Pyx	Ret	Sge	Sgr
Sco	Scl	Sct	Ser	Sex	Tau	Tel	Tri	TrA	Tuc	UMa	UMi
Vel	Vir	Vol	Vul		LMC	SMC					

Appendix C

Clusters and Cluster stars

Clusters (and cluster stars) which have no NGC or IC number are called under the generic appellation `Cl` or `Cl*` followed by the cluster names and numbers as described below. The table on the next page lists most of the possible names associated to star clusters — with the exception of NGC and IC.

The following syntax is to be used:

1. A cluster is named `Cl` followed by the cluster name and number (e.g. `Cl Blanco 1`)
2. The designation of a cluster star in the main member list of a cluster is: the cluster name preceded by `Cl` and followed by a running number (Example: `Cl Blanco 1 8` is star #8 in the open cluster Blanco 1).
3. When several lists of member stars exist, the designation is: the cluster name preceded by `Cl*` followed by an abbreviation of the list and the running number of the star in the list (Example: `Cl* Melotte 25 VA 13` is star #13 in the list by Van Altena for Melotte 25 —the Hyades cluster).

Examples of designations of stars in Clusters:

`NGC 2264`	(an NGC cluster)
`NGC 2264 2`	(a star in NGC 2264)
`Cl Melotte 25`	(Melotte 25: the Hyades cluster)
`Cl Melotte 25 1`	(1st star in the main list by Van Bueren)
`Cl* Melotte 25 VA 13`	(13th star in a list by Van Altena).

More details about nomenclature can be obtained by the commands

info cati *name* or
info *-l* **cati** *name*

the latter being used for a long description, including the authors and full bibliographical references.

Note: a similar system of designation is used for the planetary nebulae (PN), using a prefix `PN`. For instance,

`PN Hb 1` represents the 1st star in the list by Hubble.

A complete list of all such PN lists can be found by the command
info cati PN

List of cluster names

Apriamaswili	King	*Notes:*
Arp	Kron	
Barhatova	Lindsay	NGC 869 = h Per
Basel	Lynga	NGC 884 = χ Per
Berkeley	Melotte	NGC 2632 = Praesepe
Biurakan	Mrk (Markarjan)	Cl Blanco 1 = ζ Scl
Blanco	Palomar (Pal)	Cl Melotte 20 = α Per
Bochum	Pismis	Cl Melotte 22 = Pleiades
Collinder	Roslund	Cl Melotte 25 = Hyades
Czernik	Ruprecht	Cl Melotte 111 = Coma Ber
Deje	Sher	
Dolidze	Sahlbajan	
Dolidze-Dzim	Stephenson	
Dufay	Stock	
Feinstein	Terzan	
Graff	Tombaugh	
Haffner	Trumpler	
Harvard	Upgren	
Haute-Provence	VDB (Van den Bergh)	
Hogg	Westerlund	
Iskurzdajan		

Appendix D

Spectral types coding

The spectral type of a star consists of 4 parts:

- A temperature class, with the following order:
  1. Stars with subtypes: from O3 to M9
  2. White dwarfs: DC to DM
  3. Stars without subtypes: from O to M, and R, N, S, C
  4. Composite stars.
- A luminosity class. The possible values are listed below:

`unknown`	`Ia`	`Iab-b`	`II`	`III/IV`	`V`
`Ia-0`	`Ia/ab`	`Ib`	`II/III`	`IV`	`V/VI`
`Ia-0/Ia`	`Iab`	`Ib-II`	`III`	`IV/V`	`VI`

- Precisions:
  - Inaccuracy on temperature or luminosity class: colon (`:`) written just after the concerned field.
  - Indication related to the spectrum:
    * Overlap : `X`
    * Particular source : `*`
    * Quality : 0 - 7
- Peculiarities:

  Each of them is represented by one or more letters placed after temperature and luminosity classes:

variable spectrum	*v*
spectrum with emission lines	*e*
spectrum interpreted like a shell star	*sh*
peculiar spectrum	*p*
spectrum with peculiar profile:	
sharp	*s*
nebulous	*n*
very nebulous	*nn*
spectrum with peculiar elements:	
peculiar CN	*CN*
weak line	*w*
metallic lines	*m*

Appendix E

Morphological types coding

It consists of 4 parts:

The class:	elliptic	E
	spiral	S
	irregular	I
	dwarf	D
	peculiar	P
	with uncertainty	:
The type:	normal	/
	barred	B
	uncertain bar	:
The stage:	ecliptical gal.	from 0 to 9
	gal. S, I or P	O, Oa, a, ab, b, bc, c, cd, d, dm, m
Peculiarities:	r	
	s	
	p	

Moreover, two complete types can be coded if the author found that the type of a galaxy is between two standard types.

Appendix F

Description of measurement types

F.1 Overview

Each type of data listed as a result of a Simbad interrogation is normally preceded by a *header* which provides a very short title to each listed parameter. This chapter explains the meaning of each of these titles.

Note: the character ~ in a field stands for *no corresponding value* (unknown value).

There are generally several measurements for each data type; a **m** following the data type, like in the following set of MK classifications:

```
MK  |ds/mss Spectral type                        |     reference     |
-------------------------------------------------------------------------
MK m|  /    F4III                                |1975AJ.....80..637M|
MK  |MS/+ 2 F6(M) PEC                            |1975$HOUK.C01.....H|
MK  |  /    F4 III SB                            |1962$MSOM...4.....B|
```

means that the corresponding value (F4III) is the "best" one, i.e. is recommended for non-specialists (in general, when applicable, a mean value).

The following measurement types are presently included in Simbad:

CEL	Ultraviolet photometry from *Celescope*
GCRV	Stellar Radial velocities
GEN	$UBVB_1B_2V_1G$ photometry in Geneva photometric system
GJ	Absolute magnitudes and spatial velocities of nearby stars.
Hbet	H_β index (used in connection with Strömgren's uvby photometry)
HGAM	H_γ equivalent width
IRC	KI photometry from *Two Micron Sky Survey*
JP11	$UBVRIJKLMNH$ 11-colour Johnson's photometry
MK	Stellar spectral classification in Morgan-Keenan system
PLX	Trigonometric parallaxes
pm	Proper motions (in 1950 equatorial frame)
pos	Equatorial positions
ROT	Rotational velocities ($V.\sin i$)
RVEL	Radial velocities of extragalactic objects (quasars and galaxies)
SAO	Positions and proper motions from SAO catalogue.
TD1	Ultraviolet magnitudes from *TD1* experiment
UBV	UBV photometry in Johnson's photometric system
uvby	Photometry in Strömgren's photometric system
V*	Data related to variable stars
z	Redshifts (of distant galaxies and quasars)

The next sections provide more details about each data type included in Simbad. Some details concerning the photometric systems were taken from *Introduction to Astronomical Photometry* by Golay, M., 1974, *Astrophysics and Space Science Library* 41, R. Reidel Publ.

F.2 CEL measurements

Celescope catalog of ultra-violet photometry, by Davis et al., *SAO Special Report 350*, 1973.

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
CEL  |  U1 : m.e|  U2 : m.e|  U3 : m.e|  U4 : m.e|peculiarities|
       reference   |
-------------------------------------------------------------------------
CEL m|12.45:   ~|12.61: .30|    ~:   ~|    ~:   ~|P,CA,NA      |
1973$CEL..C.......D|
```

Header	*Meaning*
U1 : m.e	magnitude in U_1 filter ($\lambda\lambda$ 210-320 nm), and $\sigma(U_1)$
U2 : m.e	magnitude in U_2 filter ($\lambda\lambda$ 155-320 nm), and $\sigma(U_2)$
U3 : m.e	magnitude in U_3 filter ($\lambda\lambda$ 135-215 nm), and $\sigma(U_3)$
U4 : m.e	magnitude in U_4 filter ($\lambda\lambda$ 105-215 nm), and $\sigma(U_4)$
peculiarities	Set of peculiarities, as:
	N non-stellar object
	R radiosource
	V variable
	P peculiar spectrum
	E emission lines
	M metallic lines
	Sh shell star
	Ca interstellar lines H & K from Calcium
	Na interstellar lines D from Sodium
	A interstellar absorption at 443 nm

F.3 GCRV measurements

Stellar Radial Velocities.

```
Example:
12345678901234567890123456789012345678901234567890123456789012345
GCRV  |  rvel. Q  (nmes)|rem. |dis|     reference     |
-------------------------------------------------------
GCRV m|  -16.8 A  (  72)|     |   |1953$CIWP.6017....W|
```

Header	*Meaning*
rvel.	Radial velocity (km/s)
Q	Quality from A = *good* to D = *poor*
nmes	number of plates
rem.	Remarks concerning the radial velocity:
	E emission line
	D double line
	3 triple line
	V variable
	V? suspected variable
	O orbit
	S standard
	+ fainter companion
dis	dispersion in $\mathring{A}/mm$ at H_γ (approximative)
reference	source of the radial velocity

F.4 GEN measurements

Details about the Geneva Photometric System may *e.g.* be found in A&A Sup. 26, 275 (1976). The passbands are characterized by the two parameters λ_0 and μ defined by:

$$\lambda_0 = \int \lambda\, \varphi(\lambda)\, d\lambda \int \varphi(\lambda)\, d\lambda$$

$$\mu^2 = \int (\lambda - \lambda_0)^2\, \varphi(\lambda)\, d\lambda / \int \varphi(\lambda)\, d\lambda$$

	U	B	V	B1	B2	V1	G
λ_0 (nm)	345.6	424.5	550.0	402.4	448.0	540.5	580.5
μ (nm)	17.0	28.3	29.6	19.6	16.3	20.1	20.4

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890
GEN  | U-B  | V-B  | B1-B | B2-B | V1-B | G-B  |Wt : m.e | Vmag |Wt : m.e |
 Remarks   |     reference     |
-------------------------------------------------------------------------------
GEN m| 1.902|  .052| 1.142| 1.274|  .806| 1.067|  2: .092| 4.070|  2: .250|
      VR   |1975A&AS.1976..275R|
```

Header	*Meaning*
`U-B`	color index $U - B$
`V-B`	color index $V - B$
`B1-B`	color index $B_1 - B$
`B2-B`	color index $B_2 - B$
`V1-B`	color index $V_1 - B$
`G-B`	color index $G - B$
`Wt : m.e`	weight and σ on color indices
`Vmag`	V magnitude
`Wt : m.e`	weight and σ on `Vmag`
`Remarks`	Remark flags:
	`V` variable
	`D` multiple
	`B` spectroscopic binary
	$\star$ remark in the original catalogue
`reference`	source of the photometric data

F.5 GJ measurements

These are data related to *nearby stars* (Catalog of stars within 20 parsecs of the Sun by Gliese (*Veröfflichungen Heidelberg Nr 22*), and continuations by Gliese and Jahreiss).

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890
GJ   |  plx :p.e| Mabs  Q|  U |  V |  W |     reference     |
-------------------------------------------------------------
GJ m|  .124:005|  .50  B| -17|  -6|  -8|1969GLIES.C.......G|
```

Header	*Meaning*
plx : p.e	resulting parallax and probable error
Mabs	absolute magnitude (M_v or M_{pg})
Q	Quality on Mabs from A (very good) to F (very poor); P means that Mabs represents M_{pg}
U	component of velocity directed to ($b = 0°$, $\ell = 0°$)
V	component of velocity directed to ($b = 0°$, $\ell = +90°$)
W	component of velocity directed to ($b = +90°$)
Ref	reference

F.6 Hbet measurements

The H_β photometric system (Crawford and Mander, 1966, Astron. J. 7, 114) is the flux difference between two filters centered on H_β ($4861\mathring{A}$) with widths of 150 and 30 $\mathring{A}$ respectively. The data are currently compiled by Institut d'Astronomie de Lausanne, at Geneva Observatory (Hauck, B. and Mermilliod, M., 1985, A&A Sup. 60, 61).

```
Example:
12345678901234567890123456789012345678901234567890
hbet   | H-bet|Rnmes|     reference     |
-----------------------------------------
hbet m| 2.903|     |1980A&AS...40....1H|
```

Header	*Meaning*
H-bet	value of H_β index (in magnitudes)
Rnmes	Number of measurements, preceded by the remark
	S for standard values.
	? for unknown number of measurements.
	> for lower bound of the number of measurements.
reference	source of the H_β value

F.7 HGAM measurements

Values of the equivalent width of the H_γ line, from Petrie et al., Publ. Dominion Astrophys. Obs. 14, 151, 1973, and continuations.

```
Example:
12345678901234567890123456789012345678901234567890123456789012
HGAM  |  width (mes) |     reference     |
----------------------------------------
HGAM  |    2.0 (  2) |1973PDAOV..14..151P|
```

Header	*Meaning*
`width (mes)`	equivalent width of H_γ line ($\AA$), and number of measurements within brackets
`reference`	source of the H_γ value

F.8 IRC measurements

Infra-red measurements from the *Two micron sky survey*, by Neugebauer and Leighton, Calif. Institute of Technology, NASA, 1969.

```
Example:
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
IRC  | K-mag(mes) m.e:chi-2| I-mag(mes) m.e:chi-2|     reference      R|
------------------------------------------------------------------------
IRC m|  2.36(  3) .06: 1.78|E  3.45(  3) .06:14.34|1969$TMSS.C.......N |
```

Header	*Meaning*
`K-mag (mes)`	K magnitude (2.2 μm), eventually preceded by a remark
	`*` magnitude out of scale
	`E` χ^2 is too large
	and followed by the number of observations within brackets
`m.e:chi-2`	$\sigma(K)$ and $\chi^2(K)$
`I-mag (mes)`	I magnitude, eventually preceded by the same remark as for K magnitude, and followed by the number of observations within brackets
`m.e:chi-2`	$\sigma(I)$ and $\chi^2(I)$
`reference R`	bibliographic reference, followed by a general remark
	`R` remark in the original catalogue
	`?` question mark in the original catalogue

F.9 JP11 measurements

UBVRIJKLMNH Johnson's photometry. Each magnitude measurement is followed by the number of measurements within brackets, or the "special values"
(S) for standard stars
(?) when the number of observations is unknown

Header	*Meaning*
U (nmes)	magnitude at $\lambda_{eff} = 360\ nm$
B (nmes)	magnitude at $\lambda_{eff} = 450\ nm$
V (nmes)	magnitude at $\lambda_{eff} = 555\ nm$
R (nmes)	magnitude at $\lambda_{eff} = 670\ nm$
I (nmes)	magnitude at $\lambda_{eff} = 870\ nm$
J (nmes)	magnitude at $\lambda_{eff} = 1.2\ \mu m$
K (nmes)	magnitude at $\lambda_{eff} = 2.2\ \mu m$
L (nmes)	magnitude at $\lambda_{eff} = 3.5\ \mu m$
M (nmes)	magnitude at $\lambda_{eff} = 5.0\ \mu m$
N (nmes)	magnitude at $\lambda_{eff} = 9.0\ \mu m$
H (nmes)	magnitude at $\lambda_{eff} = 20\ \mu m$
reference	source of the photometric data

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890
JP11  | U:360 (nmes )| B:450    (nmes )| V:555    (nmes )| R:670    (nmes )|
I:87 0    (nmes )| J:1200   (nmes )| K:2200   (nmes )| L:3500   (nmes )|
M:5000   (nm es )| N:9000   (nmes )| H:20000  (nmes )|     reference     |
JP11  |   .03 (    9)|   .03    (    9)|   .03    (    9)|   .07    (    5)|
   .10    (    5)|   .02    (    9)|   .02    (    9)|  -.02    (?     )|
       ~  (     )|      ~   (     )|      ~   (     )|1966$CLPL...4...99J|
```

F.10 MK measurements

This section includes MK classifications in the Morgan-Keenan system from bibliographical surveys (e.g. by Jaschek M.), as well as the Michigan Catalogues of Two-Dimensional Spectral Types for the HD stars (Houk N., 1975, and seq.).

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890
MK  |ds/mss Spectral type                        |     reference     |
--------------------------------------------------------------------------------
MK m|  /    G2Ibvar                               |1954ApJS....1..175B|
```

Header	*Meaning*
ds/mss	Brief description of the dispersive system used:
	P prism
	G grating
	S slit spectrograph
	OP objective prism
	MS Michigan Spectral Survey
	For MS data, a *quality* index is included , in the range $[1 \cdots 4]$ from good to poor, and further notes:
	+ the spectral type was found in the literature
	X overlapping spectra
	A averaged spectral classification
Spectral type	Spectral classification in the MK system
reference	source of the spectral classification

F.11 PLX measurements

This section groups measurements of *trigonometric parallaxes*.

```
Example:
12345678901234567890123456789012345678
PLX  | plx  :p.e|     reference     |
-------------------------------------
PLX  |  .005:004|1952$YU0.1952.....J|
```

Header	*Meaning*
plx : p.e	Trigonometric parallax π ($''$), and probable error (in $10^{-3''}$)
reference	source of the parallax

F.12 PM measurements

This section groups all measurements of *stellar proper motions*, with the exception of SAO catalogue, listed separately. These data are presently given at equinox and epoch 1950, in the FK4 system.

```
Example:
123456789012345678901234567890123456789012345678901234567890123456789012345
PM  | pm-ra [ m.e ]| pm-de [ m.e ]|     reference     |
-----------------------------------------------------------
PM  |  -.026[ .015]|  +.025[ .012]|1971$AGK3.C.......L|
```

Header	*Meaning*
pm-ra [m.e.]	$\mu_\alpha . \cos\delta$ in $''/yr$, and σ within square bracket
pm-dec[m.e.]	μ_δ in $''/yr$, and σ within square bracket
reference	source of the proper motions

F.13 pos measurements

This section groups all measurements of *stellar positions*, with the exception of SAO data.

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
pos  |    alpha        delta    |me.al me.de|equi  epoch |     reference     |
--------------------------------------------------------------------------------
pos  |22 27 18.484 +58 09 31.78 | .37   .29 |1950 1956.70|1971$AGK3.C.......L|
```

Header	*Meaning*
alpha delta	α and δ in frame at equinox equi, at epoch
me.al me.de	standard errors $\sigma(\alpha\cos\delta)$ and $\sigma(\delta)$ (in $''$)
equi epoch	equinox of the frame, and epoch of the observation
reference	source of the position

F.14 ROT measurements

Stellar Rotational Velocities.

```
12345678901234567890123456789012345678
ROT  |Vsini (mes)|    reference      |
--------------------------------------
ROT  | 9    (   )|1970$KwKy.189.....U|
```

Header	*Meaning*
Vsini	projected rotational velocity $v \sin i$ (km/s)
(mes)	number of measurements
reference	source of the rotational velocity

F.15 RVEL measurements

This section deals with radial velocities of *galaxies*.

```
Example:
12345678901234567890123456789012345678901234567890123
RVEL   | Rvel   (nmes)| rem |dis|     reference     |
-------------------------------------------------
RVEL m|   +5100 (    )|     |   |1973UGC...C.......N|
```

Header	*Meaning*
Rvel (nmes)	radial velocity (km/s), and number of measurements
reference	bibliographic reference

F.16 SAO measurements

Data extracted from the SAO catalogue (*Star catalog of 258997 stars for the epoch and equinox 1950.0*, 1966) are:

```
12345678901234567890123456789012345678901234567890123456789012345678901234567890123
SAO  |   alpha          delta    : m.e| pm-ra :m.e| pm-de :m.e|
 reference         |
-------------------------------------------------------------
SAO m|22 27 18.529 +58 09 31.77  : .04|  +.012:001|  +.005:001|
1966$SAO..C.......S|
```

Header	*Meaning*
alpha delta	α_{1950} and δ_{1950} for epoch 1950.0 (FK4 system)
m.e	σ of 1950 position ($''$)
pm-ra :m.e	proper motion $\mu_\alpha \cos\delta$ in $''/yr$, and σ
pm-de :m.e	proper motion μ_δ in $''/yr$, and σ

F.17 TD1 measurements

UV fluxes from TD1 satellite, by Thompson et al. (*Scientific Research Council*, 1978); magnitudes and standard errors are derived from absolute fluxes by means of the calibration by Hayes & Latham (A. J. 197, 593, 1975).

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234
TD1  |m2740 : s.e|m2365 : s.e|m1965 : s.e|m1565 : s.e|     reference     |
-----------------------------------------------------------------------------
TD1 m| 5.42 : .13| 5.52 : .36| 5.17 : .53| 4.69 : .31|1978$TD1..C.......T|
```

Header	*Meaning*
m2740 : s.e.	magnitude at 274.0 *nm* (effective width 310$\mathring{A}$), with σ
m2365 : s.e.	magnitude at 236.5 *nm* (effective width 330$\mathring{A}$), with σ
m1965 : s.e.	magnitude at 196.5 *nm* (effective width 330$\mathring{A}$), with σ
m1565 : s.e.	magnitude at 156.5 *nm* (effective width 330$\mathring{A}$), with σ

F.18 UBV measurements

This section includes UBV data in *Johnson's UBV* system (see *e.g.* Johnson, H.L., 1963, in K.A.A. Strand (ed), *Basic Astronomical Data*, Univ. of Chicago Press, 204) compiled by J.-Cl. Mermilliod from Institut d'Astronomie de Lausanne (Mermilliod, J.-C., 1987, A&A Sup. 71, 413).

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901
UBV  |      V      B-V     U-B  |Q/nbm|  remarks  |     reference     |
--------------------------------------------------------------------------
UBV  |(*)  3.519   +.432       ~|?  1 |V          |1980ApJS...44..427M|
```

Header	*Meaning*
	The Photometric System is described by the following notes:
	(C) Cape U_cBV system
	(E) Eggen's
	(J) Johnson's 11-colour
	(*) Other non-standard system
V	V magnitude
B-V	$(B-V)$ index
U-B	$(U-B)$ index
Q/nbm	Qualities on magnitudes, from A (very good) to D (poor), or number of measurements
remarks	The possible remarks are:
	V variable
	V? suspected variable
	D double
	S standard
reference	Source of the UBV data

F.19 uvby measurements

The Strömgren *uvby* photometric system (see *e.g.* Strömgren B., 1966, Ann. Rev. Astron. Astrophys. 4, 433) is an intermediate passband photometry. The data are currently

compiled by Institut d'Astronomie de Lausanne, at Geneva Observatory (Hauck, B. and Mermilliod, M., 1985, A&A Sup. 60, 61). The filters are characterized by the following values:

	u	v	b	y
Central λ (nm)	350	410	470	550
Half-width (nm)	38	20	10	20

```
Example:
12345678901234567890123456789012345678901234567890123456789012345678901234
uvby   | b-y   |  m1   |  c1   |nbmes|     reference     |
-------------------------------------------------------
UVBY m|  .004|  .157| 1.089|     |1980A&AS...40....1H|
```

Header	*Meaning*
(b-y)	color index $b-y$
m1	index $m_1 = (v-b)-(b-y)$ (Balmer discontinuity)
c1	index $c_1 = (u-v)-(v-b)$ (line blocking)
Nmes	number of measurements for color indices. Remarks as:
	S standard values.
	? unknown number of measurements.
	> lower bound of the number of measurements.
reference	source of photometric data

F.20 V* measurements

A few parameters concerning the variable stars were extracted mainly from the *General Catalog of Variable Stars* by Kukarkin et al. *USSR Academy of Sciences* (3^{rd} edition in 1969, and continuations).

```
Example:
123456789012345678901234567890123456789012345678901234567890123456789012345
V*  |vartyp| Vmax   p   Vmin | period (d)  |  epoch (JD)  |D/rt%|
Reference          |
-----------------------------------------------------------------
V* m|Cd    |  3.90  B   5.09 |     5.3663  | 2427628.86   |30.0 |
1969$GCVS.C03.....K|
```

Header	*Meaning*
`Typ`	Type of variability, summarized below
`Max, p, min`	Maximum and minimum of brightness; `p` specifies the type of magnitudes
`P(d)`	period (in days)
`Ep(JD)`	epoch (in Julian Days), which corresponds to: • **maximum** light for pulsating variables (excluding RV Tau stars), α CVn stars, novae • **minimum** light for eclipsing and ellipsoidal variables RV Tau stars
`D/rt(%)`	Duration of eclipse for Algol type stars, Raising time for all other variable types
`Reference`	source of data

The classification defined in the **3rd** Edition is:

`ACV`	α^2 CVn	`IS`	Rapid Irregular
`BCEP`	β Cep	`L`	slow irregular
`BLLAC`	BL Lac	`LB`	slow late-type irregular
`BY`	BY Dra	`M`	Mira
`CEP`	Long-period Cepheid	`N`	Nova
`CST`	constant	`NL`	nova–like
`CW`	W Vir	`QSO`	Quasar
`DCEP`	δ Cep (Classical Cepheid)	`RCB`	R CrB
`DSCT`	δ Sct	`RR`	RR Lyr
`E`	Eclipsing binary	`RRC`	RR Lyr, $P \simeq 0.3d$
`EA`	Algol-type eclipsing binary	`RV`	RV Tau (supergiants)
`EB`	β Lyr–type eclipsing bin.	`S`	rapid variable
`ELL`	ellipsoidal	`SDOR`	S Dor
`EW`	W UMa–type eclipsing binary	`SR`	semi-regular
`GCAS`	γ Cas	`SN`	Supernova
`I`	Irregular	`UG`	U Gem
`IA`	Irregular of early type	`UV`	UV Cet (flare)
`IN`	Irregular in nebula	`UVN`	UV Cet in nebula
`INS`	Rapid irregular in nebula	`ZAND`	Z And symbiotic star
`INT`	T Tau irregular	`ZCAM`	Z Cam
		`ZZC`	ZZ Cet

F.21 z measurements

Redshift data for extragalactic sources:

`Example:`

```
12345678901234567890123456789012345
Z  |redshift R|     Reference     |
-----------------------------------
Z  |  .0658   |1989ApJS...70....1A|
```

Header	*Meaning*
`z`	Redshift $z = \sqrt{\frac{1+\beta}{1-\beta}} - 1$ where $\beta = \frac{v}{c}$
`Ref`	Redshift source

Appendix G

Journals scanned for the bibliography

The following journals and publications are currently scanned for the bibliography[1]

SIMBAD Code	Title
A&A...	Astron. & Astrophys.
A&AS..	Astron. Astrophys. Suppl. Ser.
AbOB..	Abastumanskaya Astrofiz. Obs., Byull.
AcA...	Acta Astronomica
AcApS.	Acta Astrophys. Sinica
AcASn.	Acta Astron. Sinica
Afz...	Astrofizika
AfzI..	Astrofizik. Issledovanija
$AGAS.	Astron. Gesellschaft Abstract Ser.
$AIIS.	Astrofizik. Issledovanija Sp. Obs.
AJ....	Astronomical Journal
ANac..	Astron. Nachr.
AnTok.	Ann. Tokyo Astron. Obs.
ApJ...	Astrophysical Journal
ApJS..	Astrophys. J. Suppl. Ser.
ApL...	Astrophys. Lett. & Communications
Ap&SS.	Astrophys. Space Sci.
AST...	Aster
AsT...	Astron. Tsirk. Kazan

[1] A number of additional publications, including colloquia and symposia are scanned or have been scanned, but not in a systematic way.

SIMBAD Code	Title
Ast...	Astronomy
AuJPh.	Australian J. Phys.
AZh...	Astron. Zu.
$BAAA.	Bol. Asociacion Argent. Astron.
BAAS..	Bull. American Astron. Soc.
$BCFH.	Bull. CFH
$CA...	Comments on Astrophys.
$CASP.	Contr. Astron. Obs. Skalnate Pleso
$CEsp.	Ciel et Espace
ChA...	Chinese Astron. & Astrophys.
$C&T..	Ciel et Terre
$Ear..	Earth, moon and planets
$EJP..	European J. Phys.
$EL...	Europhysics Lett.
$ExAs.	Experimental Astronomy
$GemN.	GEMINI Newsletter (RGO)
GrO...	Griffith Obs.
IAUC..	Circ. Bureau Central Telegrammes
IBVS..	IAU Inform. Bull. Var. Stars
Icar..	Icarus
$IGAO.	Izv. Glav. Astron. Obs.
IrAJ..	Irish Astron. J.
$IUEN.	IUE ESA Newsletter
Izk...	Izv. Krym. Astrofiz. Obs.
JAA...	J. Astrophys. Astron.
JAF...	J. Astronomes Francais
JAVso.	J. Am. Assoc. Variable star obs.
JBAA..	J. Br. Astron. Ass.
$JBIS.	J. Brit. Interpl. Soc.
$JHA..	J. History of Astronomy
JRASC.	J. R. Astron. Soc. Can.
$KFNK.	Kinematika Fiz. Nebesn. Tel.
Last..	L'astronomie
Merc..	Mercury
Mess..	The Messenger
MitAG.	Mitteil. Astron. Gesellschaft
MitVS.	Mitt. Verand. Sterne
MNRAS.	Mon. Not. R. Astron. Soc.
MNSAf.	Mon. Notes Astron. Soc. South Afr.
MSAIt.	Mem. Soc. Astron. Ital.

SIMBAD Code	Title
Nat...	Nature
$NInf.	Naucnye Informacii
NSci..	New Scientist
PASAu.	Proc. Astron. Soc. Aust.
PASJ..	Publ. Astron. Soc. Jap.
PASP..	Publ. Astron. Soc. Pac.
PAZh..	Pis'ma Astron. Zu.
$PBAO.	Publ. Beijing Astron. Obs.
PDAOV.	Publ. Dominion Astrophys. Obs. Victoria
$PhR..	Physics Reports
PhT...	Physics Today
$PPMO.	Publ. Purple Mountain Obs.
$PRA..	Physical Review A
$PRD..	Physical Review D
$PRL..	Physical Review Letters
PTAO..	Publ. Tartu Astrofiz. Obs.
PTRSL.	Philos. Tr. R. Soc. London
PZ....	Perem. Zvezdy
QJRAS.	Quart. J. R. Astron. Soc.
Rech..	La Recherche
RLuO..	Reports Lund Obs.
RMxAA.	Rev. Mex. Astron. Astrofis.
$RPD..	Revue du Palais de la Découverte
SAAOC.	South Afr. Astron. Obs. Circ.
$SBO..	Soobshch. Byurakan Obs.
Sci...	Science
SciAm.	Scientific American
ScN...	Science News
$SSAO.	Soobshch. Spets. Astrof. Obs.
SSRev.	Space Sci. Reviews
S&T...	Sky & Telescope
SvA...	Sov. Astron.
SvAL..	Soviet Astron. Lett.
S&W...	Sterne und Weltraum
$TAOL.	Trudy Astron. Obs. Leningrad
$TAOT.	Tartu Astrofuus. Obs. Teated
$TGAS.	Trudy Gosud. Astron. Sternberga
$VA...	Vistas in Astronomy
VAOB..	Vilnius Astron. Obs. Biul.
VSS...	Veroeff. Sternwarte Sonneberg

Appendix H

From SIMBAD II to SIMBAD III

This appendix will be useful only for those users familiar with SIMBAD II. For each function found in SIMBAD II, it gives the corresponding way to do the same thing – or the closest one – in SIMBAD III.

Entering and exiting the database and host computer:

In SIMBAD II	How to do it in SIMBAD III
Dialing SIMBAD host computer Transpac number	Three main possibilities: Through TRANSPAC: (02080)6700091733 Through INTERNET: `telnet 130.79.128.4` Through SPAN: `set host SIMBAD`
Enter the programme by `@simbad.p`...	Automatic call of `simbad`
Terminating a session through `END` or `STOP`	Use the command `session exit` (or `stop`)
Terminating if troubles: `@@X IOT`	Cancel the programme through ⟨*Ctrl*-`C`⟩
Ending the session (`@fin` and `@@term`)	at the UNIX level, send the command `exit` or `logout` or ⟨*Ctrl*-`D`⟩, eventually two times.

Main commands:

In SIMBAD II	How to do it in SIMBAD III
Searches by objects	Ask the database agent: `simbad search` *identifier*
Searches by coordinates	Ask the database agent: `simbad search` *coordinates*
Sampling	Define a filter agent: `session use filter` *filter-name* add or modify selection criteria *filter-name* set execute the sample: `simbad search -> '`*filtername*
Editor and output definition at the beginning of a session	use a *format* agent; define it (at any moment).
Selector	use a *filter* agent.

Special commands:

In SIMBAD II	How to do it in SIMBAD III
HELP	`?` for context sensitive help, or `help display` to begin at the root of the help.
INFO	`info` (short list) or `info -l` (long list)
FILE	Not yet available.
WAIT	not needed (no time-out is implemented).
STOP	use at any moment the command `stop`.
MSG	Sending a message to the CDS staff, reading messages coming from the CDS is done through the mail agent. Its main functions are `mail read`, `mail send`.
NEWS	News are displayed at the beginning of a session.
TIME	Not yet available.
TSUP	Not yet available.

Index

! **115**
/ 75, 86, 92, 115
– 92
. 115
: 115
; 92
? 48, 115
77
& 25, 53, 115

<| 115
< 115
>| 115
> 115

access to SIMBAD **13**
agent 53, **101**
    astrobj 63, **102**
    Database **101**
    filter 65, **103**
    format 73, **104**
    help 48, **106**
    macro 91, **105**
    mail 90, **106**
    objlist 71, **103**
    reflist **102**
    session 85, **102**
    UIF 47, 86, **104**
    user **105**
all 26, 64
astronomical object **63**
Astronomisches Rechen Institut 7

B-V 68
basic 26, 56, 64
basic data 9, 56
basicdata 40, 44
bib 26, 64, 70
bibcode 26, 64
bibliography 9, 40, 44, **60**, 140
bibtext 26
bibyears 26, 64, 83
BITNET 13, 43, 44, 88
bye 17, 20, 26, 31, 33, 34, 50, 54, 64, 86, 90, 92, 101, 102, 103, 104, 105, 106

c 87
CAT 69
catalog 26
catalogue 9, 24, 59, 64, 126
categories 54
CDS 8
CEL 127
CIRCLE 67
Cl 121
clone 74, 103, 104
cluster 24, 121
cmdfile 75, **88**
COM 77
command 16, 23, 53, **54**
    special 115
compil 104
component 24
connection 8
constellation 24, 120
cont 47, 87
contents 56
context 48, 54
COO 79
cooequinox 32, 83, 88
coolist **40**, 43
cooradius 33, 83
coordinates 32
criteria 36
cross identification 9, 59

CSI 8
current context 54

data 26, 64, 69
database
    network access **13**
    password **14**
    username **14**
DEC 68
DECNET 8
define 102
delete 103
describe 103
DIM 67, 79
dimension 59
display 63, 102, 103, 104, 105, 106
displayed 47
double system 58

echo 102
EDITOR 83, 94
electronic mail 43
env 44, **83**
environment 40
environment variable 74, **83**, **85**
epoch 32, 57
equi1 26, 88
equi2 26, 88
equinox 32, 57, 67, 88
EQUINOX1 83
EQUINOX2 83
ESIS 13, 14
exit 102
exit a session 50

FIELD 67
file copy 40
fileoutput 87
filter **36**, 37, **65**
FIN 77
FM-IMMEDIATE 74, 83, 107
FM-LIST 74, 83, 113
FM-STANDARD 74, 83, 84, 109
format 8, 44, **73**
    default 107
full 86
full screen mode 86

GCRV 128
GEN 129
Geneva photometry 129
GJ 130
Gliese 130
greek letter 24, 119

Hauck 136
hbet 130
Hbeta 130
help **48**
HGAM 131
host 102
host computer 8

IAP 7, 61
IC 77
id 26, 64, 78
identification 59
identifier syntax 23
idlist **40**, 43
immediate format 73
info 48, 121
inputfile 87
INSU 8
INTERNET 8, 13, 14, 44, 88
IRC 131

Jahreiss 130
Johnson 132, 136
journal 140
JP11 132

keep 63, 102
Kukarkin 137

Lausanne 7
list 40
list format 73

LLG 78
log **47**, 87
login 14
Lortet 59

macro **91**
MAG 79
magnitude 57
mail **90**
maxdata 40, 44
MB 68
measurement 9, 60, 126
Mermilliod 136
MES 81
MESCAT 80, 83, 85
MESTYP 81, 83, 85
Minitel 14
MK 132
modify 105
morphological type 58, 125
MSS 132
MT 80
MV 68

NAME 24
nbib 26, 64
ndata 26, 64
nearby star 130
NED 7, 61
network 8
  Internet 13
  SPAN 13
  X.25 13

OBJECT 69, 80
object list 33, 63, **71**
object type 64, 69, 80
OBJID 78
Observatoire de Bordeaux 7, 61
Observatoire de Genève 7
Observatoire de Lyon 7
Observatoire de Paris 7, 59, 61
off 105
on 105

page 47, 87
parallax 133
parameter 53
parameter (of a command) 54
Password 13, 15
PLX 133
PM 59, 68, 79, 133
pos 57, 134
position 134
precision 57
proper motion 32, 57, 59, 133
Proteus/Termwindows 86
public network 8, 13

Query by coordinates **32**
quit the database 50
quote 36

RA 68
radial velocity 128, 134
radius 33, 67
read 106
record length 78
redshift 138
REF 81
reference code 16, **60**
release 101, 102, 103, 104
ROT 134
RVEL 134

sampling **36**
SAO 14, 57, 59, 135
save 106
screen 86
screenoutput 86
search 101
send 106
sendlog **47**, 87
session 50, **85**
  define 84, 85
set 103, 104, 105
SIMBAD II 8, 143

simple 86
SKIP 77
smbmail **43**
SP 69, 80
SPAN 8, 13, 14, 44, 88
special command 115
spectral type 58, 123
SPL 69
SPT 69
standard format 73
stop 20, 50
Stroemgren 136

TD1 135
Teletel 14
test 105
TEXT 77
text editor **94**
TRANSPAC 13
tty 86
tty mode 86
Two micron sky survey 131

UBV 136
uif **86**
ULP 8
undisplayed 47
Unix 8
updating 9, 61
use 102
user **88**
user interface 9, 86
user.cmd **88**
Userid 13
usual 86
uvby 136

V* 137
VAR 137
variable star 58, 137
verb 53
vi **94**
Vsini 134

write 103, 104, 105

z 138