A Catalogue of Constellation Boundary Data

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Abstract

A computer readable catalogue of constellation boundary data is presented in a form suitable for the construction of star charts and atlases. Two files are available, one for equator and equinox 1875 and the other for equator and equinox 2000.

1 INTRODUCTION

The definitive list of constellation boundary data was published by Delporte (1930). A computer-readable catalogue compiled from these data has been produced by Roman (1987) and is available from the International Network of Astronomical Data Centers (catalogue number 6042). However, the format of this catalogue has been chosen to facilitate locating the constellation in which a given object lies and is unsuited to the construction of star charts and atlases. The present catalogue was also constructed from Delporte's lists, but the files are arranged in a format suitable for constructing star charts and atlases.

Two files are available in a computer-readable form. The first gives the boundaries as delineated by Delporte, in their original orientation, 1875. The

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second file gives the boundaries computed for equator and equinox 2000. In equator and equinox 1875 the lines joining the corners of the constellations were great circles of right ascension and parallels of declination. However, precession to equator and equinox 2000 distorts the boundaries so that they no longer lie along lines of constant right ascension or declination. Thus, prior to precession to equator and equinox 2000, points were interpolated at one degree intervals along the boundaries in order that they should continue to enclose the same area of sky (and thus the same set of stars).

2 THE CATALOGUE

Brief details of the two files of the catalogue are given below.

2.1 Equator and equinox 1875 file

The data in this file was taken directly from Delporte with the exception that several extra points were added to the constellation Octans (which covers the South Pole) in order to facilitate plotting in some projections. These extra points 'traverse' the line of 0hr right ascension to the Pole and 'return' at 24hr.

The file consists of the right ascension and declination of every corner of every constellation. Each record consists of a single point along the constellation boundary and contains the right ascension and declination of the point and an abbreviation identifying the constellation of which it is a part. The abbreviations used to identify each constellation are taken from Delporte, and for completeness they are listed together with the full name in Table 1. All the abbreviations consist of three characters except those for Serpens Caput and Serpens Cauda which contain four. All records referring to a given constellation occur contiguously in the file. Successive records correspond to successive points along the constellation boundary. The last point in the constellation should be joined to the first. Table 2 gives details of the structure of each record.

The following fragment of FORTRAN could be used to read a single record from the file

```
      REAL RA, DEC
      CHARACTER*4 CONNAM

      .
      .

      READ(13, 1000) RA, DEC, CONNAM
 1000 FORMAT(F8.5, 1X, F9.5, 1X, A4)

      .
      .
```

2.2 Equator and equinox 2000 file

In equator and equinox 1875, lines joining the corners of constellations are either great circles of right ascension or parallels of declination. When the coordinates are converted to equator and equinox 2000, the boundaries are distorted by precession so that they no longer lie along lines of constant right ascension or declination. In order that the new boundaries should enclose the same area of sky (and thus include the same stars) it is necessary that points should be interpolated along the boundary prior to calculating the precession. Thus the orientation 2000 file was generated from the orientation 1875 file with points interpolated at one-degree intervals along the boundaries. When the file is used to construct a chart, a smooth curve should be drawn through the interpolated points (but obviously not through those original points that define corners).

Records in the file are ordered into constellations and successive corners within each constellation in a similar fashion to the orientation 1875 file. Table 3 lists the details of the structure of each record. Like the orientation 1875 file, each record contains the right ascension and declination of a point together with an abbreviation for the constellation to which it belongs. However an additional field indicates whether the point is an original point taken directly from Delporte (code 'O') or an interpolated point (code 'I'). It should be noted that original points can be points along a meridian or parallel where three constellations meet as well as corners.

The following fragment of FORTRAN could be used to read a single record from the file

```
      REAL RA, DEC
      CHARACTER*4 CONNAM
      CHARACTER*1 TYPE

      .
      .

      READ(13, 1001) RA, DEC, CONNAM, TYPE
 1001 FORMAT(F10.7, 1X, F11.7, 1X, A4, 1X A1)

      .
      .
```

3 DISCUSSION

The present catalogue of constellation boundary data is complementary to that of Roman (1987). Roman's catalogue should be used to determine which constellation an object lies in. The present catalogue is more suited to the construction of star charts and atlases.

4 ACKNOWLEDGEMENTS

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5 REFERENCES

Delporte, E. 1930, *Delimitation Scientifique des Constellations* (Cambridge: Cambridge University Press).

Roman, N.G. 1987, *Publ. Astron. Soc. Pac.* 99, pp695-699.

Abbreviation	Constellation Name	Abbreviation	Constellation Name
AND	Andromeda	DOR	Dorado
ANT	Antila	DRA	Draco
APS	Apus	EQU	Equuleus
AQR	Aquarius	ERI	Eridanus
AQL	Aquila	FOR	Fornax
ARA	Ara	GEM	Gemini
ARI	Aries	GRU	Grus
AUR	Auriga	HER	Hercules
BOO	Bootes	HOR	Horologium
CAE	Caelum	HYA	Hydra
CAM	Camelopardis	HYI	Hydrus
CNC	Cancer	IND	Indus
CVN	Canes Venatici	LAC	Lacerta
CMA	Canis Major	LEO	Leo
CMI	Canis Minor	LMI	Leo Minor
CAP	Capricornus	LEP	Lepus
CAR	Carina	LIB	Libra
CAS	Cassiopeia	LUP	Lupus
CEN	Centaurus	LYN	Lynx
CEP	Cepheus	LYR	Lyra
CET	Cetus	MEN	Mensa
CHA	Chamaeleon	MIC	Microscopium
CIR	Circinus	MON	Monoceros
COL	Columba	MUS	Musca
COM	Coma Berenices	NOR	Norma
CRA	Corona Australis	OCT	Octans
CRB	Corona Borealis	OPH	Ophiuchus
CRV	Corvus	ORI	Orion
CRT	Crater	PAV	Pavo
CRU	Crux	PEG	Pegasus
CYG	Cygnus	PER	Perseus
DEL	Delphinus	PHE	Phoenix

Table 1: Abbreviations for constellation names.

Abbreviation	Constellation Name	Abbreviation	Constellation Name
PIC	Pictor	SEX	Sextans
PSC	Pisces	TAU	Taurus
PSA	Pisces Austrinus	TEL	Telescopium
PUP	Puppis	TRI	Triangulum
PYX	Pyxis	TRA	Triangulum Australe
RET	Reticulum	TUC	Tucana
SGE	Sagitta	UMA	Ursa Major
SGR	Sagittarius	UMI	Ursa Minor
SCO	Scorpius	VEL	Vela
SCL	Sculptor	VIR	Virgo
SCT	Scutum	VOL	Volans
SER1	Serpens Caput	VUL	Vulpecula
SER2	Serpens Cauda		

Table 1 (continued): Abbreviations for constellation names.

Number of records	1566
Record size (bytes)	25

Field	Units	Starting byte	Format
Right ascension	Decimal hours	1	F8.5
Declination	Decimal degrees	10	F9.5
Constellation		20	A4
Type of point		25	A1

Table 2: Format of equator and equinox 1875 file.

Number of records	13422
Record size (bytes)	29

Field	Units	Starting byte	Format
Right ascension	Decimal hours	1	F10.7
Declination	Decimal degrees	12	F11.7
Constellation		24	A4
Type of point		29	A1

Table 3: Format of equator and equinox 2000 file.