

<b>Institut für Weltraumforschung</b> Abt. Experimentelle Weltraumforschung Österreichische Akademie d. Wissenschaften A-8010 GRAZ / Steyrergasse 17-19 A-8010 GRAZ / Inffeldgasse 12	<b>Projekt:</b> <b>FLAT</b> Flat-File Specification	File: FLATSPEC.DOC Autor: Harald Ottacher Revision: 1 Datum: 18. Dezember 1997 Seite: 1 von 6
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# *Specification of the IWF Flat-File Data Base Management System*

Version 1.01

Date: 18. December 1997

## 1 Header File

- 1) The IWF-FLAT Filesystem's Header File (\*.HED) is an ASCII-file with 80 bytes printable ASCII characters. Each record starts with a blank character (0x20) at position 1 (i.e. 1st character of record) and ends with a blank character at position 80.  
 Due to historical reason on different operation systems and platforms the Header File have different line end marks. This come from the FORTRAN implementation of the Flat File. With the same source code the header have differnt line end marks.  
 [ OPEN( .. , ACCESS = 'direct', FORM = 'formatted', .. ) ]  
 On the PC-Platform under MSDOS / Windows a Carriage Return (CR) and Line Feed (LF) will be added each line. So on this Platform the Header File have 82 bytes.  
 ( Position 81: CR, Position 82 LF )  
 On the VAX and ALPHA under OpenVMS the header have following file format.  
 Record format: Fixed length 80 byte record  
 Record attributes: Fortran carriage control  
 Under Unix on different Platforms the Header have no line end marks.  
 Only 80 bytes per line ( DEC Unix, SUN Solaris and Solarisx86 )
- 2) An IWF-Flatfile may contain up to 499 items including the timestamp (i.e. 1 real\*8 timestamp plus 498 real\*4 variables).
- 3) Unused space within a header record is filled with blanks (0x20).
- 4) The detailed header record structure is given in Table 1.
- 5) The date for entry " date files created: " may be in format "22-AUG-96" or "1996-AUG-22".
- 6) The timestring for entry " Start time = " and " End time = " may be in format "1977-JAN-01 00:00:00.000" or "31-DEC-77 23:00:00.000".
- 7) The encoding strings are "PC ", "VAX", "DEC", "DEC". The encoding strings stands for the system on which the file is created.  
 "PC " Personal Computer (MS-DOS, SOLARIS x86)  
 "VAX" VAX or ALPHA Machines under OpenVMS  
 "DEC" DECStation under Ultrix  
 "SOL" SPARC under Solaris  
 The encoding information must be in the first abstract line.
- 8) Other predefined Abstract keywords:  
 Owner: Owner of Flat File

Source: Flat Master File  
 Orbit: Data Orbit  
 Mode: Data Mode  
 Resol: Data Resolution  
 CoordSystem: Coordinate System  
 DataType: Data Type  
 Offset: Data Offset  
 SpaceCraft: Space Craft

These predefined Abstracts can stand in the abstract section but the must not.

9) Sample IWF-FLAT Header Files are given in Table 2 and Table 3.

**Table 1: Field Definition of IWF-FLAT Header File**

Record	Contents	From - To	Fmt	Align
1	" name of header and data files: "	1 - 32	a32	---
	FlatFile Base Name (no Extension)	33 - 79	a47	left
2	" date files created: "	1 - 21	a11	---
	Date String (-> Rule 6)	39 - 49	a11	right
3	" record length of data file, in bytes: "	1 - 39	a39	---
	*.DAT File Record Length	40 - 49	i10	right
4	" number of columns: "	1 - 20	a20	---
	Number of Items incl. Time	40 - 49	i10	right
5	" number of rows: "	1 - 17	a17	---
	Number of Records in *.DAT File	40 - 49	i10	right
6	" flag for missing data : "	1 - 25	a25	---
	Missing Data Flag Value	42 - 50	e9.2	right
7	Blank Line (80 0x20 chars)	1 - 80	a80	---
8	"#"	4 - 4	a1	---
	"name"	8 - 11	a4	---
	"units"	22 - 26	a5	---
	"source"	36 - 41	a6	---
	"type"	67 - 70	a4	---
	"loc"	73 - 75	a3	---
9	" -----< 75 minus chars >-----"	1 - 76	a76	---
10	item/variable number (1 <=> Time)	2 - 4	i3	right
to	item/variable name	8 - 19	a12	left
9	item/variable unit	22 - 33	a12	left
+	item/variable source	36 - 65	a30	left
num	item/variable type ( "T" or "R")	68 - 68	a1	---
items	item/variable offset in *.DAT record	73 - 76	i4	left

10 +	Blank Line (80 0x20 chars)	1 - 80	a80	---
11 +	" NOTES: "	1 - 8	a8	---
12 +	Blank Line (80 0x20 chars)	1 - 80	a80	---
13 +	" Start time = "	1 - 14	a14	---
	Time String (-> Rule 7)	15 - 38	a24	left
14 +	" End time = "	1 - 14	a14	---
	Time String (-> Rule 7)	15 - 38	a24	left
15 +	Blank Line (80 0x20 chars)	1 - 80	a80	---
16 +	" ABSTRACT "	1 - 10	a10	---
17 +	" ENCODING: "	3 - 12	a10	---
	Encoding String(-> Rule 8)	13 - 15	a3	
18 +	" This is a sample Abstract text "	3 - 79	a77	left
num	" which would start at column 3 !!! "			
items	".. next line is a blank line "			
to	" "			
17 +	" Note: all abstract text lines "			
num	" start at column 3 "			
itmes +				
num				
abstract				
lines				
18 ++	Blank Line (80 0x20 chars)	1 - 80	a80	---
19 ++	" END"	1 - 5	a5	---

## 2 Data File

- 1) The IWF-FLAT Filesystem's Data File (\*.DAT) is an Binary-file with a variable recordlength.
- 2) Each record starts with double precision floating point value which represent the time. The data values are single precision floating point values. The description of the differnt data culomns in the data file are in the header file.
- 3) The used floting point format for the data file is the natural floating point format oft the platform. The used floating point format for the PC Flat File data format is the IEEE-P754 standard. For the VAX and ALPHA under OpenVMS only the D\_floting format for the double precision floating point value is used.

4) The value for the time in the first column of the data file record are seconds since Jan. 1, 1965

**PC-Platform:**

**Floating Point Standard IEEE-P754**

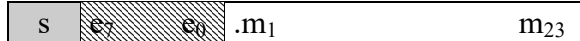
IEEE Format	word wide	sign S	exponent E wide range	mantissa M wide precision
single-precision	32 bits	1 bit	8 bits $2^{\pm 127} \approx 10^{\pm 38}$	23 bits $\approx$ 7 digits
double-precision	64 bits	1 bit	11 bits $2^{\pm 1023} \approx 10^{\pm 308}$	52 bits $\approx$ 16 digits

$$M = 1 + m_1 * 2^{-1} + m_2 * 2^{-2} + m_3 * 2^{-3} + \dots = 1 + \sum_{i=1}^k m_i * 2^{-i} \quad 1 < M < 2$$

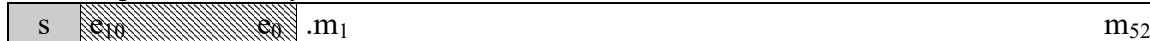
Wide

1	32	64
---	----	----

Single precision: 4 byte



Double precision: 8 byte



**Table 2: IWF-FLAT Header File with new Timestrings**

```

+-----+
| 0       1       2       3       4       5       6       7       8 |
| 1234567890123456789012345678901234567890123456789012345678901234567890 |
+-----+
name of header and data files: TESTFILE
date files created:                1996-AUG-22
record length of data file, in bytes: 60
number of columns:                 14
number of rows:                    8760
flag for missing data:              1.00E+32

#   name                units          source                                type  loc
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
001  UT                  s                Timeline - Epoch                       T     0
002  Time_PB5-01         year            I_4 [1] - Year                         R     8
003  Time_PB5-02         day            I_4 [2] - Day of Year (Jan 1          R    12
004  Time_PB5-03         msec           I_4 [3] - Elapsed millisecond         R    16
005  Traj_HI-01          AU              R_4 [1] - R                            R    20
006  Traj_HI-02          DEG            R_4 [2] - lat                          R    24
007  Traj_HI-03          DEG            R_4 [3] - long                         R    28
008  B_RTN_c-01          nT             R_4 [1] - Br (RTN)                    R    32
009  B_RTN_c-02          nT             R_4 [2] - Bt (RTN)                    R    36
010  B_RTN_c-03          nT             R_4 [3] - Bn (RTN)                    R    40
011  B_scalar            nT             R_4 - Scalar B                        R    44
012  V                   km/sec         R_4 - V                                R    48
013  N                   no/cc          R_4 - Np                                R    52
014  temp                K              R_4 - Temp                             R    56

NOTES:

Start time = 1977-JAN-01 00:00:00.000
End time   = 1977-DEC-31 23:00:00.000

ABSTRACT
ENCODING: PC
Autoprocessed by CDF2FIWF from CDF-File: p10_77
-----> Skeleton-file: p10_77.SKT

END
+-----+
| 1234567890123456789012345678901234567890123456789012345678901234567890 |
| 0       1       2       3       4       5       6       7       8 |
+-----+

```

**Table 3: IWF-FLAT Header File with old Timestrings**

#	name	units	source	type	loc
001	UT	s	Timeline - Epoch	T	0
002	Time_PB5-01	year	I_4 [1] - Year	R	8
003	Time_PB5-02	day	I_4 [2] - Day of Year (Jan 1	R	12
004	Time_PB5-03	msec	I_4 [3] - Elapsed millisecond	R	16
005	Traj_HI-01	AU	R_4 [1] - R	R	20
006	Traj_HI-02	DEG	R_4 [2] - lat	R	24
007	Traj_HI-03	DEG	R_4 [3] - long	R	28
008	B_RT̄N_c-01	nT	R_4 [1] - Br (RTN)	R	32
009	B_RT̄N_c-02	nT	R_4 [2] - Bt (RTN)	R	36
010	B_RT̄N_c-03	nT	R_4 [3] - Bn (RTN)	R	40
011	B_scalar	nT	R_4 - Scalar B	R	44
012	V	km/sec	R_4 - V	R	48
013	N	no/cc	R_4 - Np	R	52
014	temp	K	R_4 - Temp	R	56

NOTES:

Start time = 01-JAN-77 00:00:00.000  
 End time = 31-DEC-77 23:00:00.000

ABSTRACT  
 ENCODING: PC  
 Autoprocessed by CDF2FIWF from CDF-File: p10\_77  
 -----> Skeleton-file: p10\_77.SKT

END