# C.   UF Format

C.1   Introduction

UF (short for "Universal Format") is a radar data format originally proposed and documented in the "Report on a Meeting to Establish a Common Doppler Radar Data Exchange Format", page 1401 of the November 1980 *Bulletin of the American Meteorological Society.*

C.2   Single UF Ray Structure

The data consists of a single file for a complete volume scan. Within this file are a series of stand-alone rays (data acquired for a given pointing direction). All header information is duplicated for each ray. Within a ray, the data is basically all organized as 16-bit words, byte swapped in the big endian convention. The exception to this is that each ray starts and ends with a 32-bit record size indicating the number of bytes in the ray. All ASCII text is supposed to be left justified, space padded but some converter programs produce null terminated text, so the reader must be tollerant. The data format does support breaking a large ray into several records. In this case, the multiple records within the ray will have identical formats, they will have different field headers and data fields. The IRIS convertor programs do not support this feature, and will always place a ray in a single record. The optional header is only placed in the ray for the first ray of a file.

Please look in our uf.h header file for additional documentation. These structure names generally end with a "2" to indicate that they are 2-byte aligned. The default is that all IRIS structures are 4-byte alligned unless they end in a 2 or 8.

ray size 4 Bytes
<uf_mandatory_header2> 45 Words
<uf_optional_header> 0 or 12 Words
<uf_data_header2> 3 + 2N Words
<uf_field_header2>#1 19 or 21 or 25 Words
data from field #1 M Words
<uf_field_header2>#2 19 or 21 or 25 Words

data from field #2 M Words
...(repeats for each data type)...
ray size 4 Bytes
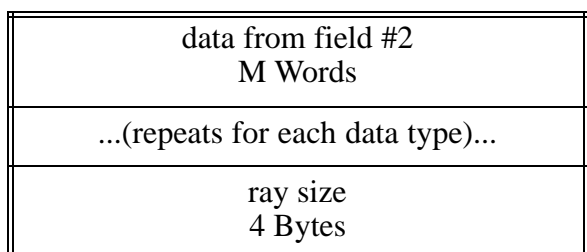
C.3   uf_mandatory_header2 Structure

Source: **uf.h**

Byte	Size	Contents
0	char[2]	Text "UF"
2	int16_t	Record Size in 16-bit words
4	int16_t	Offset to start of optional header, origin 1
6	int16_t	Local-Use Header Position (origin 1)
8	int16_t	Data Header Position (origin 1)
10	int16_t	Record Number (origin 1)
12	int16_t	Volume number on tape, n/a for disk
14	int16_t	Ray number within the volume scan
16	int16_t	Record number within ray (origin 1)
18	int16_t	Sweep number within the volume scan
20	char[8]	Radar name
28	char[8]	site name
36	int16_t	Latitude degrees (North positive, South negative)
38	int16_t	Latitude minutes
40	int16_t	Latitude seconds*64
42	int16_t	Longitude degrees (East positive, West negative)
44	int16_t	Longitude Minutes
46	int16_t	Longitude Seconds
48	int16_t	Height of antenna above sea level in meters
50	int16_t	Year (time of data acquisition)
52	int16_t	Month
54	int16_t	Day
56	int16_t	Hour
58	int16_t	Minute
60	int16_t	Second
62	char[2]	Time zone, "UT" for universal
64	int16_t	Azimuth (degrees*64) of midpoint of sample
66	int16_t	Elevation (degrees*64)
68	int16_t	Sweep mode: 0:Cal 1:PPI 2:Coplane 3:RHI 4:Vertical 5:Target 6:Manual 7:Idle
70	int16_t	Fixed angle (degrees*64)
72	int16_t	Sweep rate ((degrees/second)*64)

74	int16_t	Year (generation data of UF format)
76	int16_t	Month
78	int16_t	Day
80	char[8]	Name of UF generator program
88	int16_t	Value stored for deleted or missing data (0x8000)

C.4   uf_optional_header Structure

Source: `uf.h`

Byte	Size	Contents
0	char[8]	sProjectName[8]
8	int16_t	iBaselineAzimuth
10	int16_t	iBaselineelevation
12	int16_t	iVolumeScanHour /* Time of start of current volume scan */
14	int16_t	iVolumeScanMinute
16	int16_t	iVolumeScanSecond
18	char[8]	sFieldTapeName[8]
24	int16_t	iFlag

C.5   uf_data_header2 Structure

Source: `uf.h`

Byte	Size	Contents
0	int16_t	Number of fields in this ray
2	int16_t	Number of records in this ray
4	int16_t	Number of fields in this record
6	int16_t	Data type of field #1 (SIGMET standard): VR:velocity SW:spectrum width DR:ZDR CZ:Corrected dBZ DZ:Total dBZ RH:RhoHV PH:PhiDP KD:KDP LH:LdrH LV:LdrV
8	int16_t	Field #1 field header position
10	int16_t	Data type of field #2
12	int16_t	Field #2 field header position
...		

C.6   uf_field_header2 Structure

Source: `uf.h`

Byte	Size	Contents
0	int16_t	Data offset from start of record, origin 1
2	int16_t	Scale factor, met units = file value/scale
4	int16_t	Start range km

6	int16_t	Start range meters
8	int16_t	Bin spacing in meters
10	int16_t	Bin count
12	int16_t	Pulse width in meters
14	int16_t	Horizontal beam width in degrees*64
16	int16_t	Vertical beam width in degrees*64
18	int16_t	Receiver bandwidth in Mhz*64 ?
20	int16_t	Polarization: 1:horz 2:vert 3:circular 4:ellip.
22	int16_t	Wave length in cm*64
24	int16_t	Sample size
26	char[2]	Type of data used to threshold
28	int16_t	Threshold value
30	int16_t	Scale
32	char[2]	EditCode
34	int16_t	PRT in microseconds
36	int16_t	Bits per bin, must be 16
38	12	<uf_fsi2>

C.7   uf_fsi2 Structure

Source: **uf.h**

Byte	Size	Contents

If velocity data:

| 0 | int16_t | Nyquist velocity |
| 2 | int16_t | <spare> |

If DM data:

0	int16_t	Radar Constant
2	int16_t	Noise Power
4	int16_t	Receiver Gain
6	int16_t	Peak Power
8	int16_t	Antenna Gain
10	int16_t	Pulse Duration (microseconds*64)

If Other data:
nothing