

Digisonde™ Portable Sounder Data Format

RSF Data Format

An RSF ionogram file consists of a variable number of 4 096 byte blocks. Each block contains a Header and a variable number of Frequency Groups. The RSF Header structure is described in the Table 1.

Table 1 The RSF Header

RSF

HEADER

ITEM	DESCRIPTION	UNITS	RANGE	ACCURACY	PRECISION	TYPE	FORMAT
Record Type	Block identification	-	7 (first block) 6 (all other blocks)	exact	exact	char (1 byte)	Z2
Header Length	Total number of bytes taken by Header	-	60, fixed	exact	exact	char (1 byte)	I2
Version Marker	Version control char	-	FF (hex), fixed	-	-	char (1 byte)	Z2
General Purpose PREFACE	See Table 6-3						

Each Frequency Group contains a 6-byte PRELUDE and a single height profile of a variable length. Table 2 summarizes the possible settings of Frequency Group lengths depending on the number of heights selected by the operator.

Table 2 Length of the RSF Frequency Groups Depending on Ionogram Settings

NUMBER OF HEIGHTS PREFACE Char #36-37)	NUMBER OF FREQUENCY GROUPS IN A BLOCK	NUMBER OF RANGE BINS STORED IN A GROUP	LENGTH OF A FREQUENCY GROUP (BYTES)
128	15	128	262
256	8	249	504
512	4	501	1008

For each sounding frequency, one or two Frequency Groups are stored depending on a setting of O/X polarization option, A, PREFACE Char #29. If A is less than 8, both polarizations are stored each taking an individual Frequency Group, otherwise only O polarization height profile is stored for each frequency.

Each range bin takes 2 bytes in an RSF Frequency Group (see Tables 3 and 4)

Table3 Content of an Individual Range Bin in RSF File Format

MSB	LSB	
5-bit Amplitude	3-bit Doppler Number	Byte 1
5-bit Phase	3-bit Azimuth	Byte 2

Table 4 Individual Bit Sections of the Range Bin

ITEM	UNITS	RANGE	ACCURACY	PRECISION	TYPE	FORMAT
Amplitude	3 dB	0-31	1	1	5 bit unsigned integer	-
Doppler Number	See text	0-7	1	1	3 bit unsigned integer	-
Phase	11.25°	0-31 (0-359°)	1	1	5 bit unsigned integer	-
Azimuth	60°	0-7 (0-359°)	1	1	3 bit unsigned integer	-

The 6-byte PRELUDE precedes each set of range bins in a Frequency Group (see Table 5 on the following page). The PRELUDE uses a packed-BCD encoding scheme where each byte contains two 4-bit digits (0-9) each taking a nibble. The frequency reading stored in PRELUDE is the actual sounding frequency. The offset

from the nominal frequency is stored in byte #4. If offset was caused by forcing of sounding out of restricted frequency range, the actual frequency reading is given and the offset is set to E (hex) to indicate the case.

Table 5 PRELUDE Byte Organization

BYTE #		DESCRIPTION	UNITS	RANGE	ACCURACY	PRECISION	TYPE	FORMAT
1	high nibble	Polarization	-	3 (O) 2 (X)	-	-	BCD nibble	1 digit
	low nibble	Group size	encoded	2 (262), 3 (504), 4 (1004)	-	-	BCD nibble	1 digit
2, 3		Frequency Reading	10 kHz	within the ionogram frequency range	10 kHz	10 kHz	packed BCD	4 digits
4	high nibble	Offset	encoded	0 (-20 kHz) 1 (-10 kHz) 2 (no offset) 3 (+10 kHz) 4 (+20 kHz) E (forced) F (no transmission)	-	-	nibble	Z1
	low nibble	Additional Gain	3 dB	0-15	3 dB	3 dB	nibble	Z1
5		Seconds	sec	00-59	1	1	packed BCD	2 digits
6		Most Probable Amplitude	3 dB	0-31	3 dB	3 dB	packed BCD	2 digits

The last block of an RSF ionogram may be incomplete. To indicate END-OF-IONOGRAM (EOI), a 6-byte EOI marker consisting of EE(hex) is put on place of the PRELUDE.