Digisonde™ Portable Sounder Data Format

DFT Data Format

The DFT drift data file consists of a variable number of 4 096 byte blocks, each block containing 8-bit amplitudes and phases of the Doppler spectra. The smallest data entity is a *sub-case* which contains a four Doppler spectrum for each antenna obtained at one frequency, one height gate, and one polarization setting. Each Doppler spectrum in a sub-case is 2^N elements long, where N is selected by the operator. The amplitudes of individual Doppler spectra are grouped in sets of 128 elements for storage in the DFT file, each set of 128 amplitudes may contain data from one to four antennas depending on the setting of N. 128 amplitudes are followed by 128 phase values of the same Doppler spectrum or spectra.

653. The first byte of the first block in the DFT file is always forced to be a Record Type (0x0a). The structure shown by Table 6-14 on the next page illustrates the arrangement.

654. For one frequency a variable number of height gates may be selected. All sub-cases recorded for a single frequency comprise a *Height Set* and all those recorded simultaneously during one CIT are called a *CIT Set*. All sub-cases contained within one 4 096 block of drift data comprise a *Case*.

Table 6-14 DFT File Structure

BLOCK COUNT	BYTE COUNT	DATA DESCRIPTION
1	1	Record Type (0x0a for Drift), 1 byte
	2-128	1st $128/2^N$ * 8-bit amplitude spectra (as log-amplitudes in 3/8 dB units) with least significant bit replaced by serially written header data
	129-256	128 8-bit Phase values of Doppler lines stored in previous 128 bytes
	257-4096	Repeat previous 256 bytes 15 more times. Order of spectra is antenna 1-4, heights, frequencies, polarization
2	4096-...	Repeat 4 096 byte blocks until end of data, placing 256 bytes of EE (hex) at end of data. If not end of a 4 096 byte block, then zero fill

* Where 2^N is # of Doppler lines in the stored spectra

The drift HEADER information is stored serially in the LSB of spectra amplitude bytes, LSB of the values first. The HEADER consists of Record Type (4 bits), Drift PREFACE (228 bits or, 57 4-bit nibbles), and a variable number of sub-case headers (52 bits, or 13 4-bit nibbles, each). This arrangement is illustrated in Table

6-15.

Table 6-15 Drift Header Information Stored Serially in LSB of Amplitudes

BIT REQUIRED	DESCRIPTION
4	Record type (0x0a for Drift) - 1 nibble
228	Drift Data PREFACE (57 nibbles)
52	Subcase Header (Next 5 items in 13 nibbles): Actual Frequency in kHz (5 nibbles), coded decimal Height in km of Maximum Amplitude Signal for first Subcase (4 nibbles), coded decimal Height Bin Number of max amplitude (2 nibbles), binary Automatic Gain Offset 6 dB units of attenuation (in addition to base gain), 1 nibble Polarization (X=0, O=1), 1 nibble
52	Repeat Subcase Headers for all heights (1st freq and polarization), then store another group of heights for all frequencies, then store another height/freq group for X polarization (if selected)

The Drift Data PREFACE structure is shown in Table 6-16. Each PREFACE value is a 4-bit nibble and thus takes four bytes of the spectra amplitudes to be stored.

Table 6-16 Drift Data Specification

ITEM #	DESCRIPTION	UNITS	RANGE	ACCURACY	PRECISION	TYPE	FORMAT
1, 2	Year	years	0-99	-	-	4-bit BCD	2 digits
3, 4, 5	Day of Year	days	1-366	-	-	4-bit BCD	4 digits
6, 7	Hour	hours	0-23	-	-	4-bit BCD	2 digits
8, 9	Minute	minutes	0-59	-	-	4-bit BCD	2 digits
10, 11	Second	seconds	0-59	-	-	4-bit BCD	2 digits

12	Schedule #	-	1-6	-	-	4-bit BCD	1 digit
13	Program	-	1-8 (A-G)	-	-	4-bit BCD	1 digit
14, 15	Drift Data Flag	-	FF (plain) FE (1/2 width Doppler shift)	FX codes comprise DPS	-	4-bit hex	-
16	Journal, *J*	bit-encoded	bit 0: new gain bit 1: new height bit 2: new freq bit 3: new case	-	-	4-bit hex	binary
17	First height of sampling window	10 km	00-99	10 km	10 km	4-bit BCD	2 digits
18	Height resolution	encoded	2 - 2.5 km 5 - 5 km 10 - 10 km	2.5 km	2.5 km	4-bit hex	binary
19	Number of Heights	encoded	8 - 128 0 - 256	-	-	4-bit BCD	binary
20 - 25	Start Frequency	100 Hz	010000 - 450000	1 kHz	100 Hz	4-bit BCD	6 digits
26	Disk IO	-	Ah	-	-	4-bit hex	binary
27	Frequency Search Enabled	-	0 (no) 1 (yes)	-	-	4-bit BCD	binary
28. 29	Fine Frequency Step	10 kHz	0-255	10 kHz	10 kHz	swapped 4-bit nibbles of 1 byte binary	unsigned char

30	Number of small steps in a scan, *S*, absolute value	-	0 to 15	-	-	4-bit hex	binary
31, 32	Number of small steps in a scan, *S*	-	-15 to +15 negative value means no multiplexing	-	-	swapped 4-bit nibbles of 1 byte binary	signed char
33, 34	Start Frequency, *LL*	1 Mhz	01 to 45	1 MHz	1 MHz	4-bit BCD	2 digits
35	Coarse Frequency Step, or number of repetitions	encoded	0 (200 kHz) 1 (100 kHz) 2 (50 kHz) 3 (25 kHz) 4 (10 kHz) 5 (5 kHz)	-	-	4-bit BCD	binary
36, 37	Start Frequency, *LL*	1 Mhz	1 to 45	1 MHz	1 MHz	4-bit BCD	2 digits
38	Bottom Height, *B*	100 km	0 to 15	100 km	100 km	4-bit hex	binary
39	Top Height, *T*	100 km	0 to 15	100 km	100 km	4-bit hex	binary
40	Unused	-	-	-	-	-	-
41 - 43	Station ID	-	000 to 999	-	-	4-bit BCD	3 digits
44	Phase Code, *X*	-	1 (complim.) 2 (short) 3 (75% duty) 4(100% duty) +8 (no phase switch)	-	-	4-bit hex	binary

45	Multi-antenna sequencing and O/X polarization options, *A*	-	0 (sum), 1-4 (individual antennas), 7 (antenna scan), +8 (only O polarization)	-	-	4-bit hex	binary
46, 47	CIT length	sec	0 - 255	1 sec	1 sec	Two 4-bit nibbles of 1 byte binary	unsigned char
48	Number of Doppler lines, *N*	encoded, actual value is power of 2	3 - 7 (power of 2)	-	-	4-bit BCD	binary
49	Pulse Repetition Rate, *R*	encoded	0 (50 pps) 2 (100 pps) 3 (200 pps)	-	-	4-bit BCD	binary
50	Waveform, *X*	-	1 (complim.) 2 (short) 3 (75% duty) 4 (100% duty) +8 (no phase switch)	-	-	4-bit hex	binary
51	Delay, *D*	50 msec	0 - 15	50 msec	50 msec	4-bit hex	binary
52	Frequency Search Offset	-	0, 1, 2, 3, 4, E, F	-	-	4-bit hex	binary

53	Auto Gain, *G*, *offset*	6 dB	0 - 15	6 dB	6 dB	4-bit hex	binary
54, 55	Heights to Output, *O*	-	0 - 255	-	-	swapped 4-bit nibbles of 1 byte binary	unsigned char
56	Number of polarizations	-	1 or 2	-	-	4-bit BCD	1 digit
57	Start Gain	6 dB	0 - 15	-	-	4-bit hex	binary