Data could be recorded to Compact Flash (CF) card, personal computer or both devices.
The CF card binary file format description is given in the Table 1. The data stream format from LEMI to PC is given in the Table 2. LEMI sends data to PC each second. LEMI is controlled by and communicates with PC using the protocol described in the Table 3.
The communication interface - RS232, 57600 baud, start bit, 8 data bits, stop bit.

Table 1. LEMI-025 Compact Flash Data Format

Title		Bytes		Comments
		#	quant.	
Caption			32	
	0x4c	0	1	Char, ASCII code of symbol “L”
	0x30	1	1	Char, ASCII code of symbol “0”
	0x32	2	1	Char, ASCII code of symbol “2”
	0x35	3	1	Char, ASCII code of symbol “5”
Station number	0x47	4	1	Binary-decimal number
Year		5	1	Binary-decimal number
Month		6	1	Binary-decimal number
Date		7	1	Binary-decimal number
Hours		8	1	Binary-decimal number
Minutes		9	1	Binary-decimal number
Seconds		10	1	Binary-decimal number
Latitude*1		11-15	5	Binary-decimal number
Longitude*2		16-21	6	Binary-decimal number
STATUS GPS		22	1	Char, “A” – Active; “P”-Passive, “O” – no antenna, “S” – short circuited cable.
	0x00	23	1	Reserved byte
Voltage UIN	UIN*10	24	1	uint8
Bias field, uT	BX-DAC *400	25-26	2	int16; little-endian format
	BY-DAC *400	27-28	2	int16; little-endian format
	BZ-DAC *400	29-30	2	int16; little-endian format
		31		Service information
Reading 1, including			16	
Magnetic variations, uT	BX-Var	0 – 3	4	BX-Var, BY-Var, BZ-Var – float32 (little-endian format)
	BY-Var	4 – 7	4	
	BZ-Var	8 – 11	4	
Temperature, C*100	TF*100	12-13	2	int16 (little-endian format) TF – sensor and TE – electronic un.
	TE*100	14-15	2	
…	…			Readings 2-29
Reading 30			16	
512	32 + 30*16 = 512			

Example of position codes: *1: **49 47 94 45 4e => 49° 47.9445' N**
*2: **00 24 00 54 96 45 => 0024° 00.5496' E**

Char – ASCII character, unsigned integer, 8 bits.
uint8 - unsigned integer, 8 bits; int8 - signed integer, 8 bits.
int16 - signed integer, 16 bits; float32 - floating-point, 32 bits.

Table 2. Data stream from LEMI-025 to PC

N# of byte in the packet	Name	Description	Comments
0	L		L025
1	0		
2	2		
3	5		
4	Station number		1 - 255
5	Year	00000101	Binary-decimal number; 05
6	Month	00010000	Binary-decimal number; 10
7	Day	00010010	Binary-decimal number; 12
8	hour		Binary-decimal number;
9	minute		Binary-decimal number;
10	second		Binary-decimal number;
11-12	Data TF*100		int16; little-endian format TF – sensor and TE – electr. un.
13-14	Data TE *100		
15-16	DAC-X		int16; little-endian format Counts of the digital-to-analog converter (DAC) of the bias subunit
17-18	DAC-Y		
19-20	DAC-Z		
21-22	BX-DAC*400		int16; little-endian format (Bias field)*400, uT rounded to 2.5 nT
23-24	BY-DAC *400		
25-26	BZ-DAC *400		
27	Reserved byte	0x00	
28-39	Data BX-Var	Reading 1 12 bytes	float32 (little-endian format) Magnetic variations data, uT
	Data BY-Var		
	Data BZ-Var		
40-51		Reading 2	
52-147		Readings 3-10	
148	MODE		uint8 1 – FLASH 2 – PC 3 – Flash + PC
149	FLASH FREE		uint8; free volume of memory, %
150	Voltage UIN	UIN*10	uint8; Battery voltage
151	STATUS GPS		Char; “A” – Active; “P”-Passive, “O” – no antenna, “S” – short circuited cable.
152	Check sum		

NOTE! The magnetic data transferred from LEMI to PC are assigned to the nearest time mark received from GPS and the necessary time scale correcting shift (-0.3 second) is carried out by the PC software.

Table 3. Communications protocol between LEMI-025 and PC

#	Command name	Command code / response								Comments
		1	2	3	4	5	6	7	8	
1	Read time	3D	31	-	-	-	-	-	-	PC => LEMI
		3F	31	*05* Year	*13* Day	*11* Month	*23* Hour	*15* Min	*59* Sec	LEMI => PC Binary-decimal numbers
2	Set time	3D	32	*05* Year	*13* Day	*11* Month	*23* Hour	*15* Min	*59* Sec	PC => LEMI Binary-decimal numbers
		3F	32	*05* Year	*13* Day	*11* Month	*23* Hour	*15* Min	*59* Sec	LEMI => PC Binary-decimal numbers
3	Set coefficients 1	3D	33	XX	Mode	-	-	-	-	PC => LEMI Mode: 1 – FLASH 2 – PC 3 – FL + PC
		3F	33	00	Mode					LEMI => PC
4*	Read coefficients 1	3D	34	-	-	-	-	-	-	PC => LEMI
		3F	34	00	Mode	UIN*10	Mode1			LEMI => PC Mode1: 0 – menu; 1 – record
5	Set coefficients 2	3D	35	XX	XX	Ax1				PC => LEMI float32; little-endian format
		Ay1				Az1				
		Beta				Gamma				
		Xi				Exy				
		Eyz				Exz				
		K1x				K1y				
		K1z				K2x				
		K2y				K2z				
		KTF				KTE				
		KTF0				KTE0				
		KVBAT								
		3F	35	-	-	-	-	-	-	LEMI => PC
6	Read coefficients 2	3D	36	-	-	-	-	-	-	PC => LEMI
		3F	36	XX	XX	Ax1				LEMI => PC float32; little-endian format
		Ay1				Az1				
		Beta				Gamma				
		Xi				Exy				
		Eyz				Exz				
		K1x				K1y				
		K1z				K2x				
		K2y				K2z				
		KTF				KTE				
		KTF0				KTE0				
		KVBAT				-				

#	Command name	Command code / response								Comments
		1	2	3	4	5	6	7	8	
7	Read GPS data	3D	37	XX	XX	-	-	-	-	PC => LEMI
		3F	37	Latitude (5 bytes)					Lo...	LEMI => PC Binary-decimal numbers
		Longitude (6 bytes)					Altitude (3 bytes)			
8	Read Config	3D	30	XX	XX	-	-	-	-	PC => LEMI
		3F	37	*30 ('0')*	*32 ('2')*	*35 ('5')*	*20 (' ')*	SN		LEMI => PC Binary-decimal numbers SN - Station number
9*	Stop_system	3D	38	-	-	-	-	-	-	PC => LEMI
										There is no response from LEMI!
10	Start_system	3D	39	-	-	-	-	-	-	PC => LEMI
		3F	39	-	-	-	-	-	-	LEMI => PC
11	Check FLASH	3D	3A							PC => LEMI
		3F	FL-size_MB uint16; LE		FLfree uint8	-	-	-	-	LEMI => PC
12*	Set DAC-X	3D	3D	DAC-X	-	-	-	-	-	PC => LEMI int16
										There is no response from LEMI!
13*	Set DAC-Y	3D	3E	DAC-Y	-	-	-	-	-	PC => LEMI int16
										There is no response from LEMI!
14*	Set DAC-Y	3D	3F	DAC-Z	-	-	-	-	-	PC => LEMI int16
										There is no response from LEMI!

Notes: The microcontroller executes commands marked by the asterix "*" in the data recording mode only. Other commands (not marked by "*") are executed when there is no data recording.