The Rome-GSFC magnetometer E3 onboard Helios

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- The Rome-GSFC magnetic field experiment utilized a triaxial fluxgate (saturable inductor) magnetometer.

- The sensor unit were mounted on the end of a boom approximately four meters from the spacecraft spin axis.

- The three analog outputs of the magnetometer were converted into three 9 bit digital words.

- The experiment utilized an automatic inflight range switch to select the optimum dynamic range out of 4 ranges.

- A nonmagnetic thermally oscillating actuator was used to reorient the sensor unit by 90 deg to determine all three axes zero levels. The accuracy was approximately plus or minus 0.1 gamma.

- The vector measurements were made at equal intervals in time ranging from 16 per second down to 1 per second depending on the telemetry bit rate

Different operation modes

Resolution (Sensitivity)	
Range 3	±0.03γ
Range 2	±0.09γ
Range 1	±0.28γ
Range 0	±0.84γ
Dynamic Range	
Range 3	±16γ
Range 2	±48γ
Range 1	±144γ
Range 0	±432γ

Experiment Mode	Bit Rate	Format	Distribution Mode	Words per Frame	Δt (sec)
Detailed Mode	4096 2048	5 5	Any	16	0.0703 0.1406
"	2048 1024 512	1 1 1	"	12	0.1875 0.375 0.75
"	512 256 128 64	2 2 2 2	"	12	0.75 1.5 3 6
"	64 32 16 8	3 3 3 3	"	12	6 12 24 48
Average Mode	128 64	2 2	"	12	3 6
"	64 32 16 8	3 3 3 3	"	12	6 12 24 48

Operation modes

Distribution Mode DM	Data Conditioning for Transmission			Data Conditioning for Storage		
	Format FM		Bit Rate BM	Format FM		Bit Rate BM
DM Ø Real Time with-out Memory Read-In	FM 1 High Rate FM 2 Normal Rate FM 3 Reduced Rate FM 4 Engineering FM 5 Very High Rate		512-2048 bps 64- 512 bps 8- 64 bps 8-4096 bps 2048-4096 bps			
DM 1,2,3 Real Time with Shock Data Memory Read-In	FM 1 High Rate FM 2 Normal Rate FM 3 Reduced Rate FM 4 Engineering		512-2048 bps 64- 512 bps 8- 64 bps 8-4096 bps	FM 6 Shock		DM 1: 4096 bps DM 2: 8192 bps DM 3:16384 bps
DM 4 Real Time with Memory Read-In	FM 4 Engineering		128 bps	FM 4 Engineering		128 bps
DM 5 Black-out	FM 3		8 bps (continuous)	FM 3 Reduced Rate (controlled by Sequencer)		8 bps (interrupted)
DM 7 Memory Read-out	FM 3 Reduced Rate FM 4 Engineering FM 6 Shock		8-4096 bps			

The spacecraft could operate in ten bit rates ranging from 8 to 4096 bps for real time operation.

Parallel to the real time transmission it was possible to store continuously, in one part of a 524288 bit memory, data from some of the experiments at bit rates from 4096 to 16384 bps, with fresh data cyclically overwriting old ones until a shock event was identified (shock mode).

Shock data were then stored and new data were cycled in one part of the memory (rolling buffer) .

The full content of the core memory could be transmitted to Earth on command .

➢ Detailed data from E3 were stored on magnetic tapes (7traks, 800bpi)

➢ After several years they were no longer readable and detailed data were lost

➢ At the present the highest time resolution we have is 6 sec

➢ The only information we have relatively to detailed data is 6sec variance for each component and the field magnitude computed as average of the magnitudes of the detailed data.