



SEDIS IV

A Compact Digital Recorder for Seismic Surveys

The Instrument

SEDIS IV is a lightweight seismic recorder offering various options for seismic surveys, namely Wide Aperture Reflection / Refraction Seismic Profiling (WARRP) investigations, seismicity and microearthquake studies, and conventional reflection seismic surveys.

The instrument can be used offshore (integrated in an Ocean Bottom Seismograph (OBS)) or as a stand-alone seismic unit onshore. It is a



perfect tool to obtain accurate seismic data to evaluate reliable 2- and 3-dimensional models of velocity distribution and reflectivities. Both marine and land versions record up to six channels (hydrophones and/or geophones) on hard disk with optional compression and choice of capacity - usually 10 GByte allowing up to 20 days of continuous data acquisition (see specification). A flash memory of 0.5 GByte is also built in the instrument.

Power is provided by alkaline D-size batteries, solar panels and batteries. Activation of the instrument and selection of recording parameters can be programmed with any IBM compatible PC. Data compression of minimum 2.5 x is also possible and event detection and event storage is included in the software and can be activated if required .

Software for quality control and instrument test functions is included. It is possible to record continuously or at prefixed time windows. Precise sampling rates (selectable from 1 to 16 ms) are guaranteed by a stabilised quartz.

Onshore Application

During land operations, an integrated GPS-receiver triggers the internal clock and provides the station coordinates. Input impedance can be adjusted to the type of geophone used. The six channels available offer various combinations of vertical and horizontal geophones e.g. six individual vertical or two three-component (3K) geophones.

The land version of the SEDIS has a waterproof housing. It is light and easy to handle. Its robust construction has been tested under all possible environments including deserts, jungles and sub-zero conditions.

Offshore Application

The OBS is cased in a glass sphere which can be deployed up to water depths of 6700 m, recording seismic signals directly on the seafloor with a gimbal mounted 3K-geophone and a deep sea hydrophone. The instrument has no connection to the sea surface and is recovered by acoustic or time release.



In order to increase the density of recording, vertical hydrophone arrays can be deployed. This type of survey allows a WARRP evaluation, prestack migration and eventually CDP processing of the obtained data in shallow or deep water.

Technical Specification of SEDIS IV

Acquisition Unit



Input Channels

- 6 differential analogue inputs
- input signal range ± 5 V
- overvoltage protection ± 40 V

Digitizer

- high performance Delta-Sigma A/D converter CS5321 on each channel
- sampling rates: 31.25, 62.5, 125, 250, 500, 1000 sps
- high performance Delta-Sigma A/D converter CS5321 on each channel
- digital filter CS5322, passband: 12.9, 25.7, 51.5, 102.9, 205.9, 411.9 Hz.
- dynamic range > 120 dB @ 250 sps
- clock oscillator: OCXO, 0.01ppm, -10°C to +60 °C
- temperature measurement on quartz
- recording of supply battery voltage

Main Processor Unit

- processor: StrongARM (TM) SA1100

- onboard memory: 16 MByte DRAM
- programming interface: RS-232, infrared wireless port
- compression algorithm

GPS Unit

- trimble embedded GPS receiver SveeSix-CM3

Compass module (OBS version)

- Vector 2X, 2-axis compass (2° accuracy, 1° resolution)
- temporary recording possible

Power supply unit

- voltage: 9-36 VDC
- power consumption: standby ~ 0.6 W
recording ~ 1.5 W for 6 channels
 $P = 0.9 W + n * 0.1 W$ (n = number of channels)

Data storage

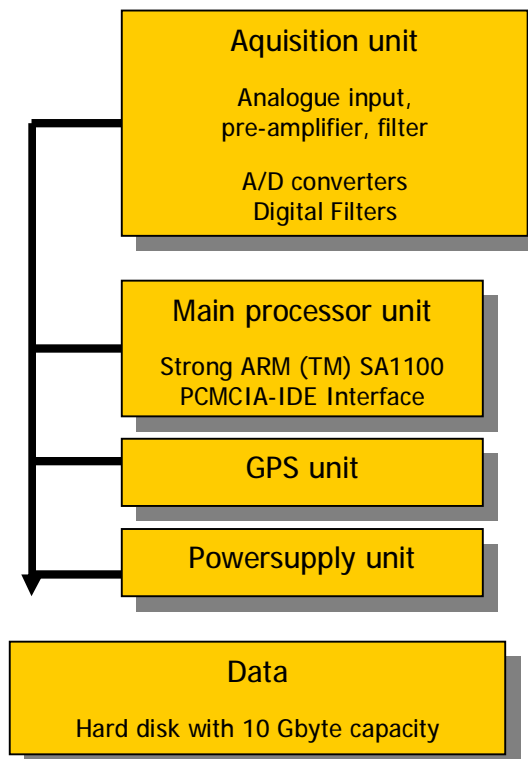
- 2.5" IDE Hard Disk, up to 30 GByte storage capacity (compression possible) and 0.5 GByte flash memory
- Integrated event detection and extraction

Recording period

- for 10 GByte HD, 3 channels, 125 sps = more than 100 days (without compression)

$$\text{No. days} = \frac{HDCapacity[GByte] * K}{\text{No. Channels} * \text{Sampling Rate}} ; K = 4142$$

with data compression 2.5x longer.



Ocean Bottom Seismograph (OBS)

SEDIS IV – OBS (Ocean Bottom Seismograph)

Glass sphere housing 17'' withstanding pressure to 6700m waterdepth

6 channel availability with recording choice of 1 to 6
 - 3C-geophones
 - Vertical hydrophone arrays

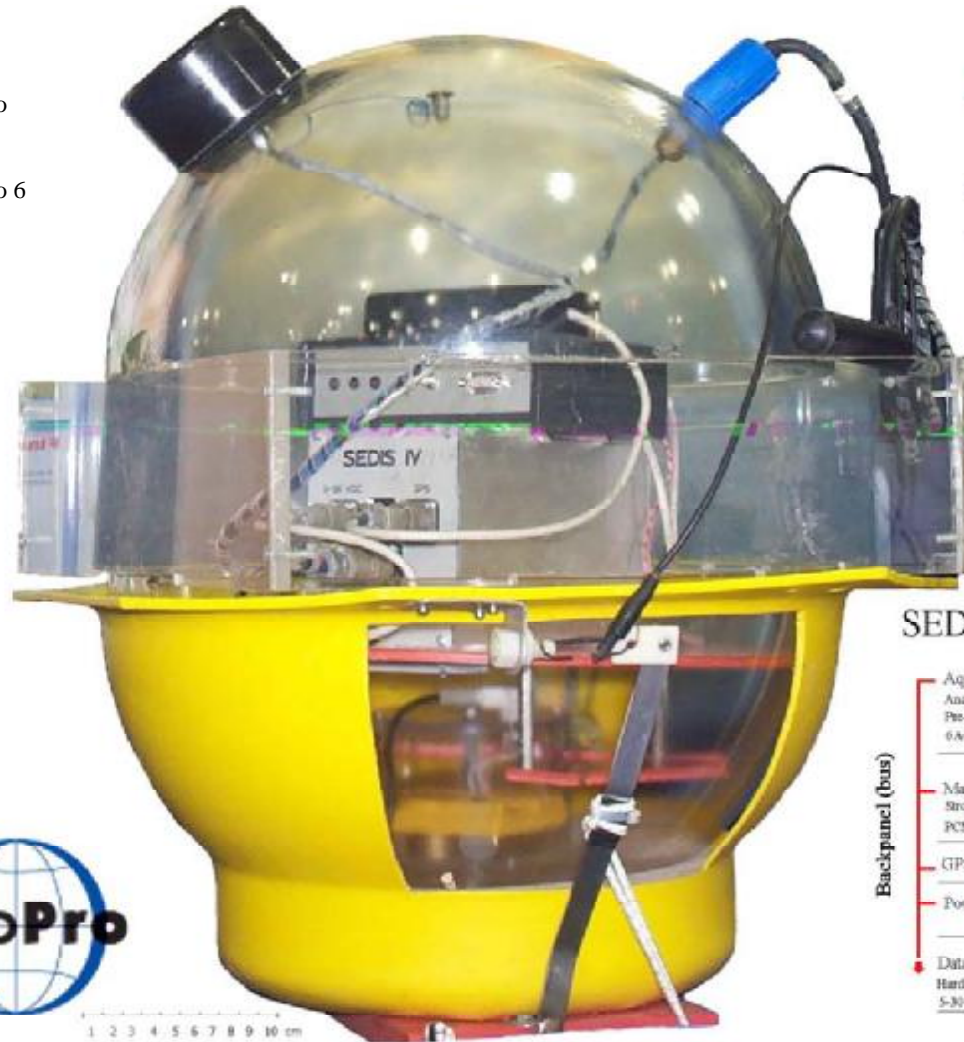
120 dB dynamic range, 24 A/D converter

Variable sampling rate

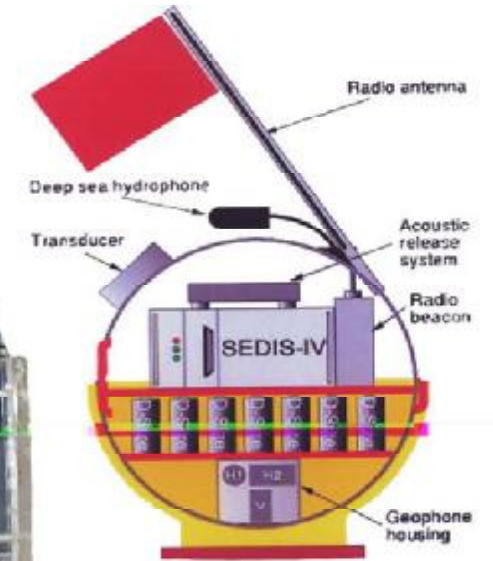
Acoustic and time release

Integrated compass

Located by radio transmission and light indicator



Arrangements of OBS components



SEDIS IV Six Channel Seismic Recording Station

Backpanel (bus)	Specifications
Acquisition unit	<ul style="list-style-type: none"> Analogue input Pre-amplifier filter 6 A/D converters
Main processor unit	<ul style="list-style-type: none"> Strong ARM (TM) SA 1100 PCMCIA-IDE interface
GPS unit	
Power supply unit	
Data storage unit	

<ul style="list-style-type: none"> Lightweight seismic recorder Variable use for : <ul style="list-style-type: none"> WARRP (Wide Aperture Reflection/Refraction Profiling) conventional seismic studies reservoir monitoring seismicity and microearthquake studies 6 seismic channels Sampling frequency : 500,250,125,62.5 Hz 120 dB dynamic range, 24 bit A/D converter 30 Gbyte storage capacity Power consumption less than 1.5 W Quartz triggered, GPS based time control PC-based menu driven setup



SEDIS IV Six Channel Seismic Recording Station

Backpanel (bus)	Acquisition unit Analogue input, Pre-amplifier, filter 6 A/D channels	<ul style="list-style-type: none"> Lightweight seismic recorder Variable use for: <ul style="list-style-type: none"> WAKAP (Wide Aperture Reflection Refraction Profiling) conventional seismic studies passive monitoring seismicity and microseismicity studies 5 seismic channels
	Main processor unit Strong ARM (TM) SA 1100 PCMCIA-IDE interface	<ul style="list-style-type: none"> Sampling frequency : 500,250,125,62.5 Hz
	GPS unit	<ul style="list-style-type: none"> 120 dB dynamic range,24 bit A/D converter
	Power supply unit	<ul style="list-style-type: none"> 30 Gbyte storage capacity Power consumption less than 1.5 W
	Data storage unit Hard disk with 5-30 Gbyte capacity	<ul style="list-style-type: none"> Quartz triggered,GPS based time control PC-based menu driven setup



Geophone

0 1 2 3 4 5 6 7 8 9 10 cm