



Introduction to Profiling Equipment

- Internally recording
 - Data recorded in semiconductor memory, battery powered
- Real-time
 - Data telemetered back to the ship as measurements are made
- Auxiliary sensors
 - Dissolved oxygen
 - pH, ORP
 - Fluorometers, transmissometers , etc.
- Water sampling equipment

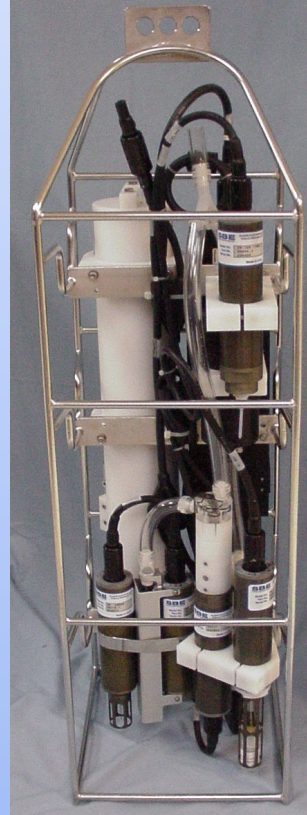


Profiling Products

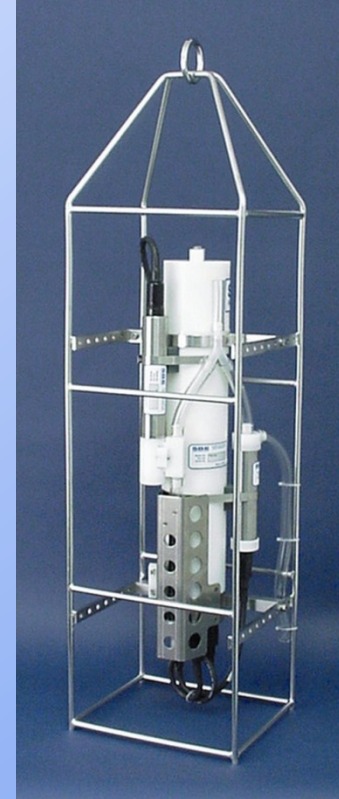
SBE 9plus



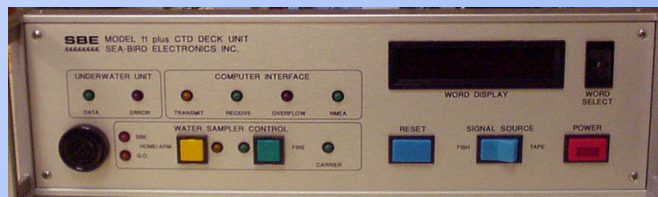
SBE 25



SBE 19plus V2



SBE 49



SBE 11plus

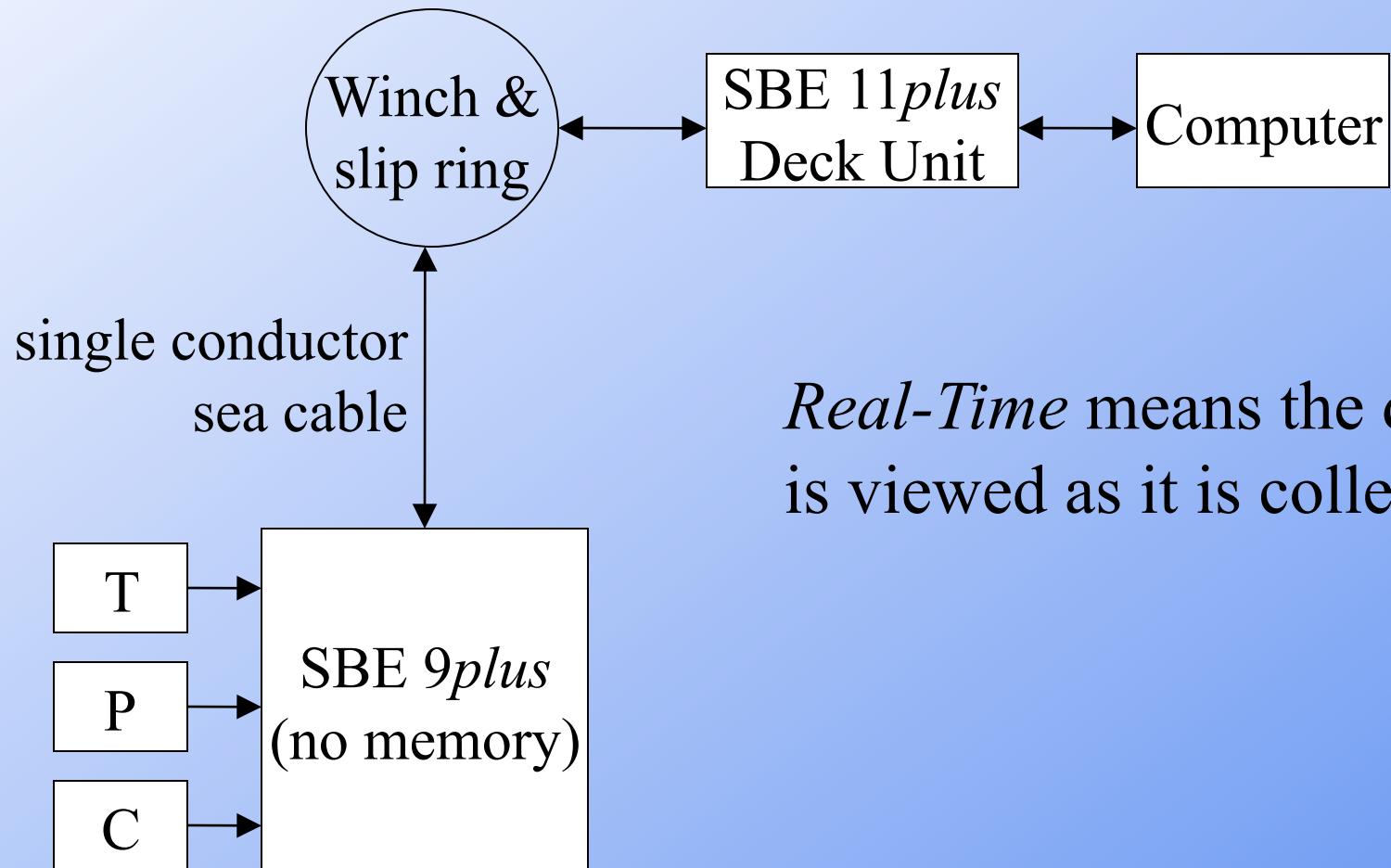


Profiling Products

SBE	Sampling Rate	Channels for Auxiliary Sensors	Memory	Power	Real-Time Data Transmission	Comments
				Internal / External		
911plus	24 Hz	8 A/D	16 Mb with optional SBE 17plus V2	External, Internal with SBE 17plus V2	Yes	World's most accurate, high resolution CTD, water sampler control
25	8 Hz	7 A/D	1 or 8 Mb	Both	Yes -- may require SBE 36 Deck Unit & PDIM	High resolution logging CTD with multi-parameter support, water sampler control with SBE 33 Deck Unit
19plus V2	4 Hz	6 A/D; 1 RS-232	64 Mb	Both	Yes -- may require SBE 36 Deck Unit & PDIM	<i>Personal CTD</i> , small, self-contained, adequate resolution, water sampler control with SBE 33 Deck Unit
49	16 Hz	No	No	External	Yes – may require SBE 36 Deck Unit & PDIM	Intended for towed vehicle, ROV, AUV



System Diagram for Real-Time Profiling



Real-Time means the data is viewed as it is collected



Conductivity, Temperature, and Depth (CTD)

- Depth is derived from a pressure sensor
 - Pressure sensor is typically internal to the main pressure housing of the CTD
- Conductivity and temperature sensors may be mounted internally or externally



SBE 4 Conductivity Sensor



SBE 3
Temperature Sensor



SBE *9plus* / *11plus* Telemetry

- Data channel 8640 bps, Differential Phase Shift Keyed (DPSK), uplink only
- Water sampler control channel 300 bps, Frequency Shift Keyed (FSK), full duplex
- Optional 9600 bps serial data uplink



SBE *9plus* / *11plus* Data Channel

- Transmission rated for up to 10 km of sea cable
- Each data scan is 30 bytes, transmitted at 24 times per second
- Each scan contains status bits denoting: pump on, water sampler channel carrier detect, bottom contact, water sampler closure occurred



SBE *9plus* / *11plus* Water Sampler Channel

- Channel is 300 bps, 8 data bits, 1 stop; water sampler commands are transmitted with 8th bit set
- Other data is passed to connector JT7 on top end cap for use by instrument
- Successful bottle closure confirmation is sent back via SBE *11plus* to computer



SBE *9plus* Frequency Counters

- 24-bit signal acquisition for T, C, and P
- Resolution in terms of degrees C / bit or Siemens/meter/bit depend on the magnitude of temperature or conductivity
- Equations for determining resolution and examples are included in the notes



SBE *9plus* Voltage Channels

- 0 - 5V signal input, 12-bit A/D
- Each bit = 0.0012V
- Each of 8 channels has a 5.5 Hz low pass filter on input, allowing us to resolve features that change at a rate of 2.75 Hz



Modular Sensors



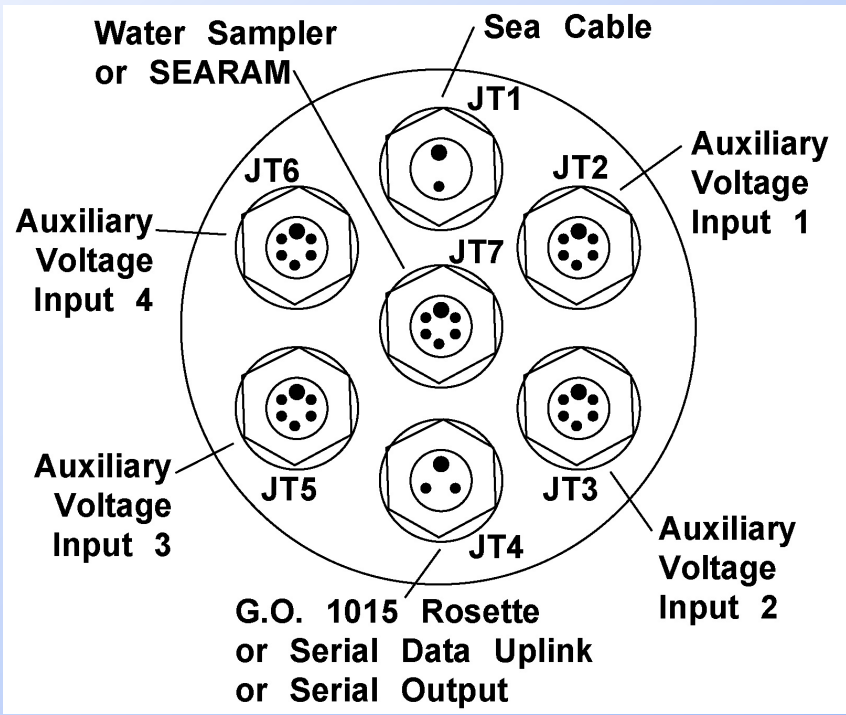
Sea-Bird



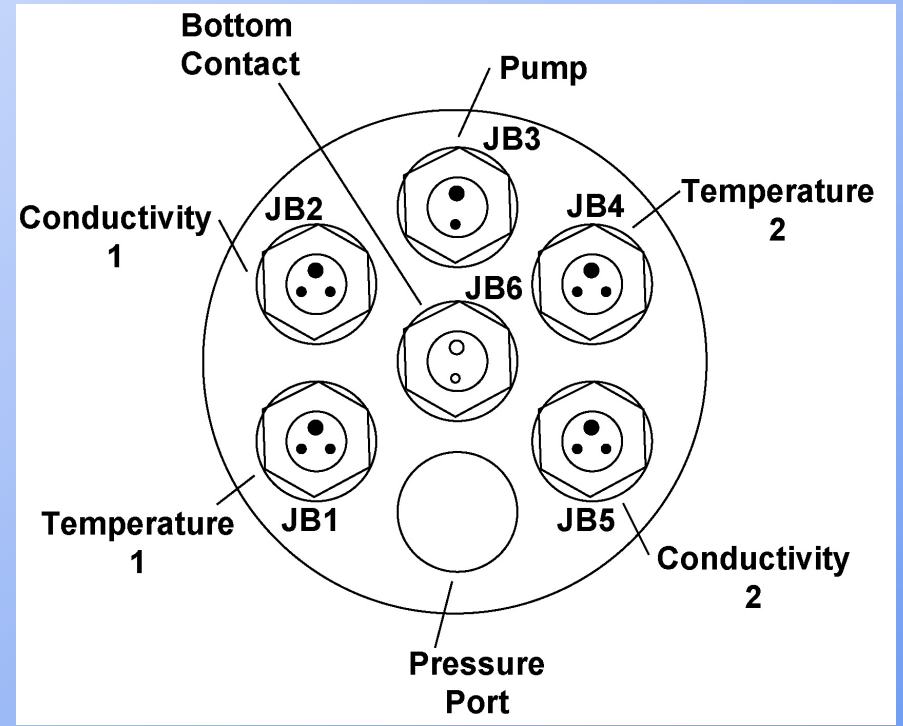
Third Party



End Caps



Top End Cap

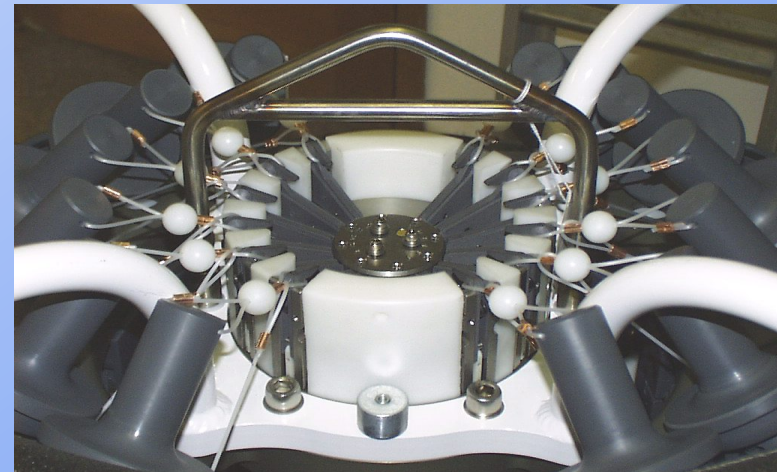


Bottom End Cap



Water Sampling Equipment

- SBE 32 Carousel,
SBE 33 Carousel Deck Unit





SBE 32 Carousel Water Sampler

Carousel	Number of Bottles	Bottle Size (liters)	CTD	Control	
				Real-Time	Self-Contained (auto bottle firing)
SBE 32 (standard)	12	1.7 - 30	<i>9plus</i>	SBE 11 <i>plus</i> Deck Unit	SBE 17 <i>plus</i> V2
	24	1.7 - 12			
	36	Consult factory			
	12	1.7 - 30	19, 19 <i>plus</i> , 19 <i>plus</i> V2, or 25	SBE 33 Deck Unit (can also be used with SBE 49 CTD)	Auto Fire Module
	24	1.7 - 12			
	36	Consult factory			
SBE 32C (compact)	12	1.7 - 8	<i>9plus</i>	SBE 11 <i>plus</i> Deck Unit	SBE 17 <i>plus</i> V2
			19, 19 <i>plus</i> , 19 <i>plus</i> V2, or 25	SBE 33 Deck Unit (can also be used with SBE 49 CTD)	Auto Fire Module (can also be used with SBE 50)
SBE 32SC (sub-compact)	12	1.7 or 2.5	19, 19 <i>plus</i> , 19 <i>plus</i> V2, or 25	SBE 33 Deck Unit (can also be used with SBE 49 CTD)	Auto Fire Module (can also be used with SBE 50)



Water Sampling with Recorded Instruments: AFM and SBE 17*plus* V2

- AFM = Auto Fire Module, closes Carousel water sampler by interpreting data from recorded instrument (SBE 19, 19*plus*, 19*plus* V2, 25)
 - Closes sampler on time or pressure, upcast or downcast
- SBE 17*plus* V2 is memory and power module with auto fire capability for SBE 9*plus*
 - Closes Carousel water sampler on pressure, upcast only



SBE 17*plus* V2

- SBE 17*plus* V2 provides memory and power for SBE 9*plus*, has 16 Mb of nonvolatile memory, supports conductivity advance and suppression of channels
- Also features Carousel auto fire capability

