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Appendix 1. Links to the devices datasheets (12/June/2004)

74HC4060 (BF frequency generator)

<http://www.philipslogic.com/products/hc/pdf/74hc4060.pdf>

AD767 12 bits DAC

http://www.analog.com/UploadedFiles/Data_Sheets/489657162ad767.pdf

AD536A (rms to dc converter)

<http://www.chipcatalog.com/Analog/AD536A.htm>

BP2G (power splitter)

<http://www.minicircuits.com/dg03-114.pdf>

CD4066

<http://www.ee.washington.edu/stores/DataSheets/cd4000/cd4066.pdf>

DS34C86T (current to voltage converter)

<http://cache.national.com/ds/DS/DS34C86T.pdf>

DS34C87T (voltage to current converter)

<http://cache.national.com/ds/DS/DS34C87T.pdf>

IL300 (optocoupler)

http://www.infineon.com/cmc_upload/0/000/008/434/IL300.pdf

INA114 (amp. de instrumentación)

<http://cfa-www.harvard.edu/~thunter/datasheets/INA114.pdf>

LM35

<http://cache.national.com/ds/LM/LM35.pdf>

MACOM's MA4CS102E (diodo detector diferencial)

<http://www.macom.com/data/datasheet/MA4E2054.pdf>

MAR-6 (power amplifier)

<http://www.gamma.pl/technical/minicirc/monamp2.pdf>

MAX238(TTL to RS232 converter)

<http://pdfserv.maxim-ic.com/en/ds/MAX220-MAX249.pdf>

MAX2102 (down-convert)

<http://pdfserv.maxim-ic.com/en/ds/MAX2102EVKIT.pdf>

MAX2640 (LNA)

<http://pdfserv.maxim-ic.com/en/ds/MAX2640-MAX2641.pdf>

MAX915 (comparator)

<http://www.nalanda.nitc.ac.in/industry/datasheets/maxim/PDF/1217.pdf>

NE5561

<http://noel.feld.cvut.cz/semi/philips/acrobat/5036.pdf>

NE592 (video amplifier)

<http://www.oselectronics.com/downloads/ne592.pdf>

OP37 (amplificador operacional)

http://www.analog.com/Analog_Root/productPage/productHome/0,2121,OP37,00.html

Pico-ADC-12 and Pico-ADC-16 (analogic to digital converter)

www.picotech.com

RSW-2-25p (switches)

<http://www.minicircuits.com/dg03-216.pdf>

STP11NB40

<http://www.mouser.com/catalog/618/319.pdf>

TS924 (operational amplifier)

http://www.jarkad.cz/katalog_listy/ts924.pdf

UMA1021M (Divisor programable del PLL)

<http://www.semiconductors.philips.com/pip/UMA1021M.html>

XR-2206

<http://www.avaya.com/electronics/datasheets/timers/XR2206v103.pdf>

Appendix 2. WISE (*Wind and Salinity Experiment*) 2000 and 2001 Instrumentation Technical documentation

- **Sea-Bird 37-SM (MicroCAT) characteristics:**

(Data provided by Sea-Bird Electronics)

The SBE 37-SM is a conductivity and temperature recorder, with internal power supply and memory for data recording. It has a RS232C serial interface and it can be programmed to give sampling rates between 10 seconds and 9.1 hours. The system uses a 24-bit A/D converter to digitise the temperature sensor voltage. The sensor is an ultra-stable aged thermistor and is referred to a VISHAY reference resistor.

PARAMETER CHARACTERISTICS		
	Temperature °C	Conductivity (S/m) *
Range	-5 to +35	0 to 7
Accuracy (1)	0.002	0.0003
Stability (2)	0.0002	0.0003
Resolution	0.0001	0.00001
Calibration (3)	+1 to 32	0 to 6

Notes:

* 1 S/m = 10 mS/cm

(1) Initial accuracy when delivered from the factory.

(2) Stability per month

(3) Range of calibration reference data.

The RMS deviation on the salinity calculation from conductivity and temperature is 0.002 psu. The time base is a TCXO of ± 5 ppm vs. temperature (in the range of -5 to $+30$ °C), with a ± 2 ppm per year ageing, equivalent to ± 2.6 minutes per year. The memory capacity, expressed as number of samples, of the SBE 37-SM MicroCAT, is 410.000 samples (C and T only). For C, T and time, the capacity is 225.000 samples. At a rate of 0.5 sample per minute 410.000 samples, it means 569.4 days of operation (19 months). At the same sampling rate 225.000 samples, it means 312.5 days of operation (10.4 months). Each full power pack is capable to endure 175.000 samples (4 months).

The battery power pack is made of six 9 V lithium batteries, having a total of 6 Ah charge.

- **Salinometer Guildline Autosal characteristics:**

The salinometer that was used is the Model 8400B. This instrument measures the conductivity and the temperature of a sample comparing from a reference water. This reference water has a salinity of 35.0000 psu. The technical characteristics of the instrument are the following:

Accuracy	0.002 psu
Resolution	0.0002 psu
Stability on temperature	0.001°C/day

- **USONIC Ultrasonic Anemometer**

Wind speed:

Range: 0-60 m/s

Resolution: 0.05 m/s

Accuracy: ± 0.1 m/s (0-5 m/s)

< 1.5% (5-60 m/s)

- **Wind direction:**

Range: 0°-360°

Resolution: 1°

Accuracy: < $\pm 3^\circ$

- **Temperature: Range: -30°... +60°**

Resolution: 0.1 °C

Accuracy: $\pm 1^\circ\text{C}$

- **AANDERAA CMB 3280 Coastal Monitoring Buoy characteristics**

Reference reading: 413

Sensors:

Wind Speed

Type: three-cup rotor.

Method of measurement: Average over the past measured interval

Range: 0.4 to 76 m/s

Resolution: 0.0746 m/s

Accuracy: $\pm 2\%$

Wind Direction (Buoy orientation sensor)

Type: Direct Earth magnetic field measured by a Hall effect compass.

Method of measurement: Average over the past measured interval.

Range: 0 to 360° referred to magnetic North

Resolution: 0.352°

Accuracy: $\pm 5^\circ$

Air Temperature

Type: Platinum PTC resistor in a radiation screened housing.

Method of measurement: Resistor bridge

Time constant (63 %): 6 minutes

Range: -8 to 41° C

Resolution: 0.048° C

Accuracy: $\pm 0.1^\circ$ C

Solar Radiation

Type: Pyranometer

Range: 0 - 2000 W/m²

Resolution: 0.4 W/m²

Accuracy: ± 20 W/m²

Relative Humidity Sensor

Type: Capacitive film sensor, in a radiation screened housing.

WISE 2000 Experiment Plan, v 2.0, 20/07/00 52

Method of measurement: Frequency of an oscillator capacitively tuned. Digital output.

Time constant: 1.5 minutes

Range: 0 to 100 %

Resolution: 0.1 %

Accuracy: ± 3 %

Wave Height

The significant wave height measured as the mean of the highest third of all the waves during the sampling interval.

Type: silicon accelerometer, mounted on a pendulum. Microprocessor controlled, measured each 200 ms and averaged.

Range: 0 to 10 meters (for wave periods of 3 to 8 seconds).

Accuracy: $\pm 10 \%$ or ± 0.2 meters (whichever is greater).

Wave Period

Type: Calculated in the same sensor with wave height.

Range: 1 to 30 seconds

Accuracy: $\pm 10 \%$

- **AANDERAA RCM9 current meter:**

Current speed

Type: Doppler sensor. Vector averaging at 600 pings during sampling interval.

Includes one tilt sensor for current speed and direction correction

Acoustic Frequency: 2 MHz

Beam angle: $\pm 1^\circ$ (Main lobe)

Range: 0 to 500 cm/s

Accuracy: 2 cm/s or $\pm 2 \%$ of actual speed.

Current Direction

Type: Uses the same Doppler sensor used for current speed.

Range 0 to 360° respect magnetic North.

Accuracy: $\pm 5^\circ$ for 0 to 15° tilt of the buoy

$\pm 7.5^\circ$ for $15 - 35^\circ$ tilt of the buoy

Water Temperature

Type: Platinum sensor located on the Doppler current sensor.

Range: -8 to 41° C

Accuracy: $\pm 0.1^\circ$ C

Appendix 3. Instruments specifications

- SONY SSC-DC393

Specifications

	SSC-DC193	SSC-DC393
Image device	1/3 type Interline Transfer Super HAD CCD	1/3 type Interline Transfer Exwave HAD CCD
Picture elements (H x V)	510 x 492	768 x 494
Sensing area	1/3" format (4.8 x 3.6 mm)	
Signal system	NTSC standard	
Sync. System	INT/LL	
Horizontal resolution	330 TV lines	480 TV lines
Lens mount	CS	
Minimum illumination	0.3 lx at F1.2 (30 IRE, AGC ON, Turbo mode) 0.6 lx at F1.2 (50 IRE, AGC ON, Turbo mode) 3.0 lx at F1.2 (100 IRE, AGC ON, Turbo mode)	0.35 lx at F1.2 (30 IRE, AGC ON, Turbo mode) 0.7 lx at F1.2 (50 IRE, AGC ON, Turbo mode) 3.5 lx at F1.2 (100 IRE, AGC ON, Turbo mode)
AGC	ON/OFF switchable	
CCD IRIS	ON/OFF (switchable), 1/60 to 1/100,000 s	
White Balance (WB)	ATW	
Back-Light Compensation (BLC)	ON/OFF switchable	
S/N ratio	More than 50 dB (AGC OFF, Weight ON)	
Video out	BNC, 1.0 Vp-p, 75 Ω, sync. negative	
Operating temperature	-10°C to 50°C (14°F to 122°F)	
Storage temperature	-40°C to 60°C (-40°F to 140°F)	
Power requirements	AC 24 V ±10%, 60Hz or DC 12 V ±10%	
Power consumption	3.5 W	3.7 W
Auto iris lens	DC/video servo switchable	
Weight	13 oz (360 g)	
Dimensions (W x H x D)	2 3/8 x 2 1/4 x 4 3/4 inches (60 x 54 x 120 mm)	
Supplied accessories	Lens mount cap (1) Operating instruction (1)	

- Ademco high resolution Lens

FEATURES:	PART NUMBERS – AUTO IRIS LENSES				
	ALD02813L	ALD0412S	ALD0812S	ALD3V813S	ALD5V5018L
Image Format	3"	1/3"	1/3"	1/3"	1/3"
Focal Length	2.8mm	4mm	8mm	3-8mm	5-50mm
Iris Range	F1.3-T360	F1.2-T360	F1.2-T360	F1.3-T360	F1.8-T360
Focus Range	.1m to infinity	.1m to infinity	.1m to infinity	.3m to infinity 1m (@tele)	.3m (@wide)
Back Focus distance	8.11mm	8.62mm	8.81mm	8.07mm (in air) 11.08 (@tele)	9.70mm (@wide)
Weight	40g	40g	40g	70g	225g
Lens Mount	CS	CS	CS	CS	CS
Iris Control	4-pin DC Control	4-pin DC Control	4-pin DC Control	4-pin DC Control	4-pin DC Control
Focus Control	Manual	Manual	Manual	Manual	Manual
Iris Control cable	230mm	100mm	100mm	100mm	100mm
Dimensions (DxLxW)	32x35x44mm	32x35x44mm	32x35x44mm	41x50x48mm	54x86x54mm

- Ultrak KC550xCP

Power

- Power Source 12V DC/24V AC +/- 10% or 230VAC +/- 10%, 50 Hz +/- 1%
- Power Consumption Max. 3.6 Watts
- Power Indicator Green LED

Sensor Information and General

- Processing Technology Sony DSP
- Image Sensor 1/3" interline transfer CCD(sony chip set)
- Picture Element 600(H) x 582(V)
- Chip Size 6.0mm(H) x 4.96mm(V)
- Unit Cell Size 9.8um(H) x 6.3um(V)
- Scanning System 2:1 interlace
- Scanning Frequency 15.625KHz(H), 60Hz(V)
- Sync System Line Lock
- Vert Phase Adjust Range 0 deg. to 360 deg
- Electronic Shutter 1/60 ~ 1/100,000 sec.
- Operating Temperature / Humidity -10°C - +50°C (14°F - 122°F) / <96% (Non-condensing)

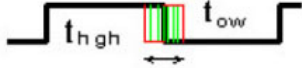
Connector and Mechanical

- Video Output BNC Connector
- Power Input 3-pin Terminal Block or Power Cord
- AI/DC Output 4-pin mini din jack (Standard Connection)
- Lens Mount C/CS(selected through back focus)
- Back Focus & C/CS Adjust Built in Back Focus Cam with Thumb Wheel Adjust (Range:-1.5mm to +6.5mm)
- B/F & C/CS Lock Phillips Tension Screw
- Mounting Hole 1/4" UNC Top and Bottom
- External Dimensions 62(W) x 54(H) x 140(D)
- Weight 290g (~10.2 oz)

Video

- Signal Format PAL 625 Lines
- Resolution 330 TV Lines
- Minimum Illumination 0.8 Lux(F1.2)
- Video Output 1.0Vp-p, 75 ohm unbalanced
- Video Iris Output 650mV at video out 1.0 Vp-p
- S/N Ratio 46 dB (AGC Off)
- BLC Size 40% center
- Sync Level 40 IRE
- White Clip 120 IRE
- Auto/Man Shutter Control (E.S.) Auto(On), Man(Off) (Dip Switch)
- Manual Shutter Control 1/60(1/50), 1/100(F.F.), 1/250, 1/500, 1/1000, 1/4000, 1/10,000, 1/100,000(Default 1/60)
- Auto Iris AI/DC (Dip Switch)
- BLC ON/OFF (Dip Switch)
- Gamma On(0.45)/Off(1) (Dip Switch)
- AGC On/Off (Dip Switch)
- Vert Phase Adjust Adjustable (Tact Switch Up/Down)
- DC Iris Level Adjust Adjustable (POT)
- White Balance Auto (3200K ~ 8000K), 3200K, 4200K, 6300K (2 Dip Switches)

- Seika clinometer

Type	N2	N3	N4
Measuring range	$\pm 10^\circ$	$\pm 30^\circ$	$\pm 70^\circ$
Resolution	$< 0.002^\circ$	$< 0.005^\circ$	0.01°
Dimensions - with Mounting Ring	.976" (24.8mm) dia. X .46" (11.7mm) h 1.46" (37mm) dia. X .46" (11.7 mm) h		
Max. Non-linearity	$< 0.2\%$ from measuring value!		
Transverse Sensitivity	$< 1\%$ at 30° tilt		
Response time	< 0.3 Sec.		
Power Supply U_{bN} (Regulated)	5 Volt		
Min ... Max. Supply U_{bZ}	3 ... 6 Volt		
Current consumption $U_b=5$ Volt	Approx. 1mA		
Protection degree	IP65		
Operating temperature	-40 to $+85^\circ\text{C}$		
Storage temperature	-45 to $+90^\circ\text{C}$		
Weight (without cable and mounting ring)	Approx. .653 ounces (18.5 grams)		
Cabling	Standard: 3 highly flexible, individually shielded wires; shielding .039" (\varnothing 1.0mm) x 7.09" (180mm) l Optional: Shielded cable .083" (\varnothing 2.1mm) x 19.69" (0.5m) l		
Values for analog DC output model at $U_{bN}=5$Volt			
Sensitivity	Approx. 12mV/ $^\circ$	Approx. 5mV/ $^\circ$	Approx. 3.2mV/ $^\circ$
Temperature drift of sensitivity	$-0.17\%/^\circ\text{C}$	$< -0.12\%/^\circ\text{C}$	
Temperature drift of zero	$< \pm 0.05\text{mV}/^\circ\text{C}$	$< \pm 0.025\text{mV}/^\circ\text{C}$	
Zero offset at $U_b=5$ V	2.5 \pm 0.1 Volt - generally: $0.5U_b \pm 4\%$		
Output Impedance	10k Ω		
Values for duty cycle for digital pulse width modulated output model at $U_{bN}=5$Volt			
			
Sensitivity $dt_{(E)}/(t_{high}+t_{low})$	Approx. $76 \cdot 10^{-3}/^\circ$	Approx. $33 \cdot 10^{-3}/^\circ$	Approx. $20 \cdot 10^{-3}/^\circ$
Temperature drift of sensitivity	$-0.17\%/^\circ\text{C}$	$< -0.12\%/^\circ\text{C}$	
Temperature drift of zero	$< \pm 1.6 \cdot 10^{-4}$ FS/ $^\circ\text{C}$	$< \pm 8 \cdot 10^{-5}$ FS/ $^\circ\text{C}$	
Middle initial point t_{high}/t_{low}	1 $\pm 4\%$		
Output frequency	Approx. 20Hz to approx. 1MHz (optional)		

