 <p>impresub DIVING AND MARINE CONTRACTORS</p>	<p>Prelievi ed Analisi dei Campioni Per Lavori di Disinquinamento del Seno di Ponente del Porto di Brindisi <b>Rapporto Finale</b></p>	<p>Marzo 2002  Com n.10/2001 Pagina 28</p>
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## SEZIONE 4. RISORSE IMPIEGATE

Per l'esecuzione dei lavori in oggetto sono state impiegate le seguenti risorse:

### 4.1 PERSONALE

E. Ibbà	Responsabile del contratto
P. Bellato	Geologo responsabile di cantiere
D. Carrà	Geologo addetto al trattamento dei campioni
M. Vivona	Navigatore senior
M. La Pica	Navigatore
C. Fasano	Tecnico addetto al sistema di carotaggio
P. Colella	Tecnico addetto al sistema di carotaggio
F. Cerrano	Tecnico addetto al sistema di carotaggio
G. Guardati	Stesura rapporto finale

### 4.2 MEZZO NAVALE

Il mezzo navale impiegato per le operazioni in oggetto è il Survey/Vessel "Uragano" caratterizzato dalle seguenti caratteristiche principali:

Nome:	S/V Uragano
Classe:	R.I.Na.
Bandiera:	Italiana
Costruzione:	1972 (trasformato 1988)
Lunghezza:	37.66 m
Larghezza:	7.30 m
Stazza lorda:	192 ton
Immersione:	2.80 - 3.50 m
Velocità di crociera:	13 nodi
Motore principale:	LISTER diesel 1000 HO

Motori Ausiliari:	No. 1 200 HP AIFO No. 1 52 HP LISTER No. 315 HP VM
Gru:	Idraulica, portata 3 ton
Verricelli:	No. 2 salpa-ancore prora No. 1 poppa 17 ton No. 2 verricelli

#### 4.3 STRUMENTAZIONE ED ATTREZZATURE

Durante i sondaggi sono state impiegate le seguenti apparecchiature:

##### 4.3.1 Sistema di posizionamento satellitare

Sistema satellitare GPS Skyfix Spot con metodo Differenziale composto da:

- ricevitore GPS MK III comprendente ricevitore GPS 12 canali, unità di controllo / demodulazione ed uscite seriali
- antenna GPS
- mini antenna satellitare
- unità d'alimentazione
- software esterno GPS Talk per il set-up dell'unità

##### 4.3.2 Girobussola

Per il controllo degli azimut (allineamenti e rotte) e per consentire di posizionare adeguatamente i sensori esterni alla nave, è stata utilizzata una girobussola elettronica Robertson RGC 50, interfacciata con il computer di navigazione.

##### 4.3.3 Sistema di navigazione e acquisizione dati

Per la gestione della navigazione e dell'acquisizione dati sono state impiegate le seguenti risorse:

- computer HP Vectra Pentium 120
- software di navigazione HydroNav 6.06
- monitor a colori SVGA per il navigatore.
- monitor a colori VGA per il pilota nave
- stampante grafica Epson
- sistema di interfaccia per il sistema di posizionamento satellitare
- sistema di interfaccia per girobussola

#### **4.3.4 Campionatori**

Per l'esecuzione dei campionamenti è stato impiegato un carotiere tipo "Kullenberg" corredato di aste di varia lunghezza e piastre di zavorra per un totale di 1200 kg.

Era disponibile a bordo anche un vibrocarotiere di tipo Senkovich per fondali sabbiosi

#### **4.3.5 Verricello idrografico**

E' stato utilizzato un verricello oceanografico munito di 100 m di cavo d'acciaio, sistema conta-metri elettronico, tensionatore, guidacavo e pulegge.

#### **4.3.6 Sistemi di alimentazione**

I sistemi di alimentazione erano costituiti da:

- gruppo elettrogeno da 80 kVA
- gruppo di continuità da 2000 VA
- alimentatori stabilizzati da 24V - 3kVA
- alimentatori stabilizzati da 12V
- batterie da 12V -100 Ah

#### 4.3.7 Comunicazioni

Le comunicazioni tra le varie unità a bordo: Sala controllo navigazione / verricello coperta - plancia, sono state gestite tramite un sistema di comunicazioni via cavo Clear-Comm.

Le comunicazioni tra terra e bordo sono state assicurate da apparati radio ricetrasmittenti multi-canale operanti in banda marina con potenze fino a 25 W e da radiotelefono cellulare.

## SEZIONE 5. SPECIFICHE TECNICHE APPARATI

M/N Uragano

SkySpot

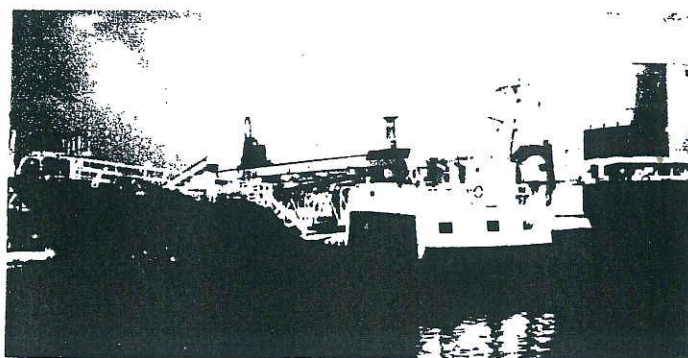
Hydro

Carotiere a gravità Kullenberg

Vibrocarotiere Sencowitch



M/N URAGANO



Principali caratteristiche/Main characteristics

• Nome/ Name	: M/N Uragano I
• Armatore/ Owner	: ImpresubMed Siracusa
• Bandiera/Flag	: Italiana/ Italian
• Classifica/ Classification	: R.I.Na.
• Matricola/Serial No.	: 1 PS 574
• Nom. Internaz. / Call sign	: I.O.I.R.
• Anno Costruzione/ Construct. Year	: 1979
• Lunghezza/ Length	: 37 Mt.
• Larghezza/ Breadth	: 7,10 Mt.
• Pescaggio/ Draft	: 3 Mt.
• Stazza lorda/ Gross T.	: 197 T.
• Stazza netta/Net T.	: 106 T.
• Motori/ Propulsion	: 1 LISTER 1.000 HP
• Eliche/ Propellers	: 1 PASSO VARIABILE
• Thruster /Thruster	: 1 100 HP
• Velocita' / Speed	: 13 knots
• Generatori/ Generators	: 3 (180-120-40 Kw)
• Gru/ Cranes	: 1 x 5 T.
• Verricelli/ Winches	: 2 ( bow/ stern)
• Radar	: 1
• Bussola/ Compass	: 1
• Pilota aut./Auto pilot	: 1
• Radio SSB	: 1
• Radio Vhf	: 1
• Telef. Satellitare/ Sat. Telephone	: 1
• GPS c/w Plotter	: 1
• Ecoscandaglio /Echo sounder	: 1
• Tender	: 1
• Trasporto tecnici/ Transportation of technicians	: 12
• Alloggi/ Accomodation	: 1 x Captain 3 x Seamen 4 x Technicians
• Cucina con mensa/ Galley c/w messroom	: 1
• Servizi completi/ Toilets c/w showers	: 3
• A richiesta/ Options	: Accomodation x 8 Technicians

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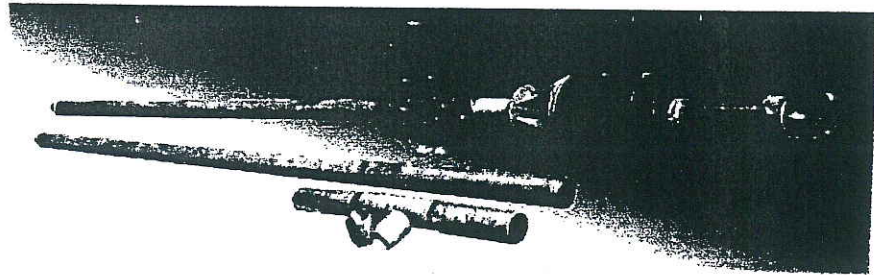


## GRAVITY CORER

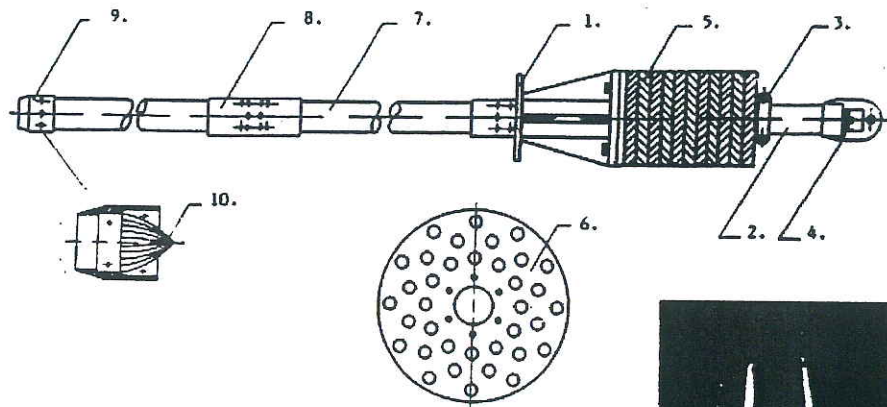
Kullenberg system

### GENERAL SPECIFICATIONS

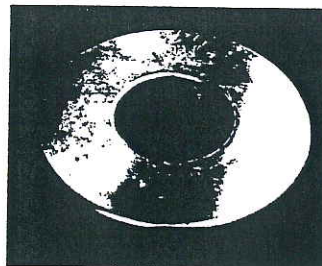
The Kullenberg corer is a modification of a piston-operated gravity corer capable of obtaining long (up to 20 m) cores from depth up to 100 m, dependent only on cable length.



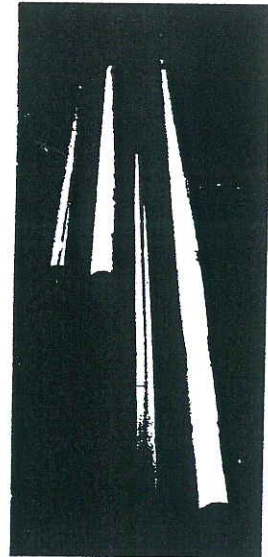
A long, heavily weighted steel core barrel is allowed to freefall into the sediment, then retrieved by a winch.



1. Coring body
2. Weight base (without weights)
3. Lock clamps for weights
4. Top-nut with counter-flap
5. 50 kg weights
6. Baseplate
7. Coring tube, 5,0 m.  $\varnothing$  140 /  $\varnothing$  130 mm
8. Tube connector
9. Cutting head
10. Sample returning flap (orange peel principle)



Weight for the main rack.



Corer tubes comes in different lengths: 2,2 or 4,2 meters.

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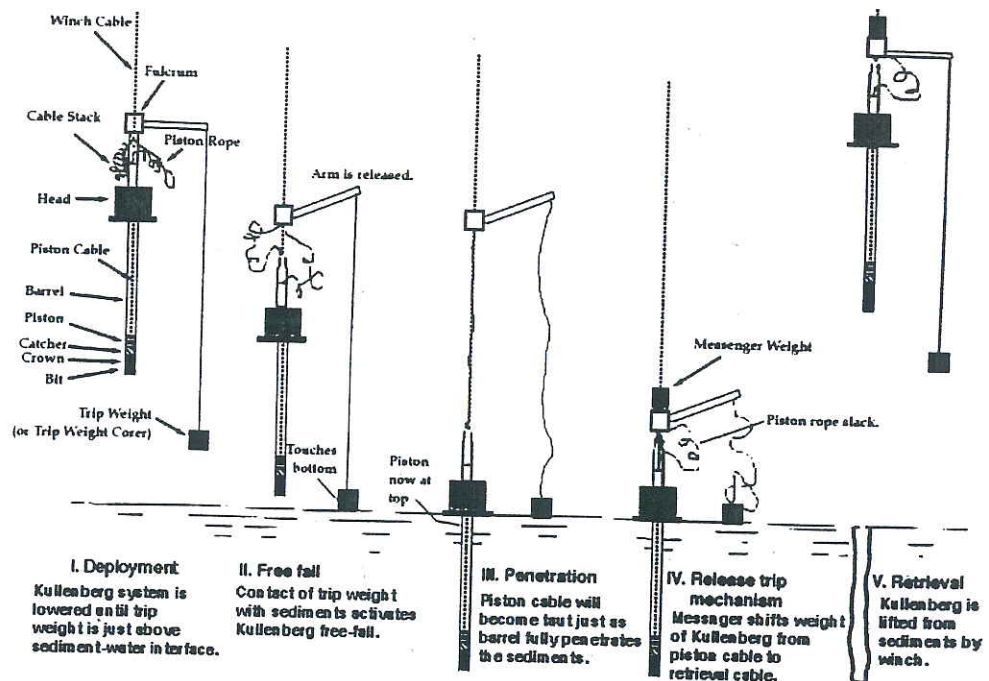
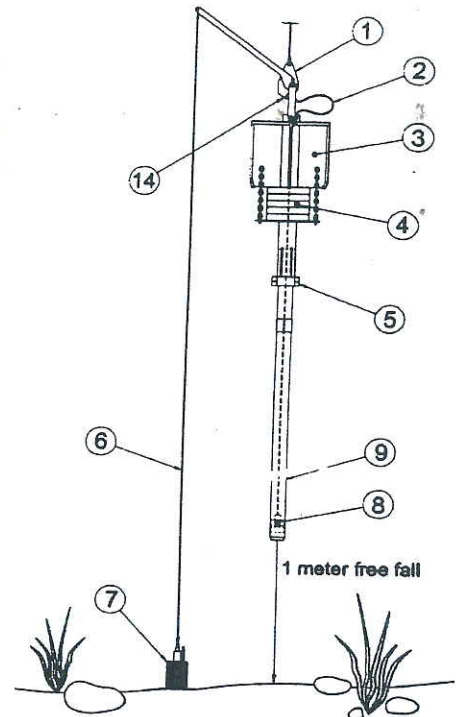
EQUIPMENT DATA



## GRAVITY CORER

Kullenberg system

The Piston corer takes up to 2 meters deep undisturbed samples from soft sediment and up to 4 meters deep samples from muddy sediment. A stainless steel heavy duty releaser (1), based on the Kullenberg principle, is mounted at the top. Up to 10 printing alloy weights (4) can be mounted. The corer tube (9) is either made of stainless steel ( $\varnothing 104/99\text{mm}$ ) or transparent PVC plastic ( $\varnothing 110/99\text{mm}$ ). At the end of the releaser hook (1) the 30 kg release weight (7) is mounted. At the bottom of the corer tube a piston (8) with a leather seal is positioned. The piston is connected to the releaser (1) by a  $\varnothing 8\text{mm}$  stainless steel wire. During operation the corer tube (9) is released from a variable height variable above the sediment as the releaser weight reaches the sediment surface. The wire (8), which in this case has a slack of about 1 meter, allows the corer tube to fall free until the piston (7) is activated just before the corer tube enters the sediment. The penetration depth can be regulated by the total weight load (4). When the sample is to be retrieved, the tube is positioned at two bristles and a piston rod, operated by a stainless steel ratchet, presses out the sediment sample for slicing.



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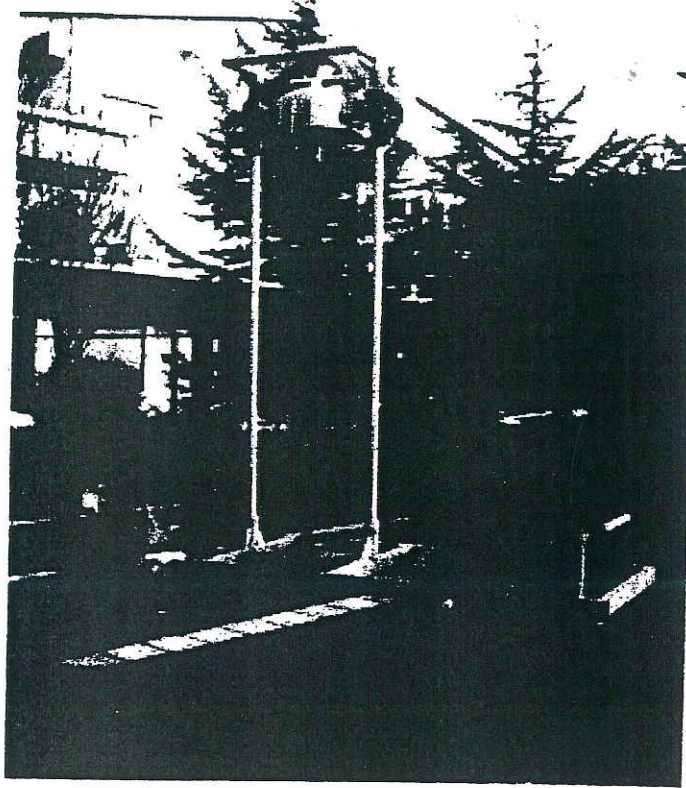
EQUIPMENT





## VIBROCORER

Senkowitch



### General Description

The Senkowitch coring equipment is a device of vibrocorer type and is developed to obtain cores from the seabed at depths up to 250 metres.

The equipment is placed on the seafloor and consists in principle of a vertically free moving steel core barrel with a length up to 5.25 m.

The barrel is driven into the soil by an electric ram, housed in a waterproof chamber and connected to the top of the core barrel. While the barrel is driven into the soil it is guided by two vertical steel legs secured to the framework allowing the barrel to move freely through the centre of the lower end of the guiding device.

The pedestal of such construction prevents the coring equipment from sinking into the mud in locations where a soft seabed is encountered.

The core barrel is fitted with an air nozzle and compressed air is driven into the barrel during the lowering to compensate the water pressure. When the vibrating bit penetrates the seabed the air pressure in the barrel will increase. This is caused by the entry of air into the barrel. The operator will release sufficient air pressure to ensure continuous core recovery.

After maximum penetration has been reached, the core barrel is hoisted into the framework, after this the whole system is taken on board the survey vessel.

Cores are extracted from the barrel on board the survey vessel and can be examined on the spot or the complete barrel and core can be sealed and taken ashore for examination in a soil mechanic laboratory.

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## VIBROCORER

Senkewitch

### Technical Data

Two electric vibrator engines  
- make: Wacker  
- type: AR 15/380  
- capacity: 3.000 vibrations/minute

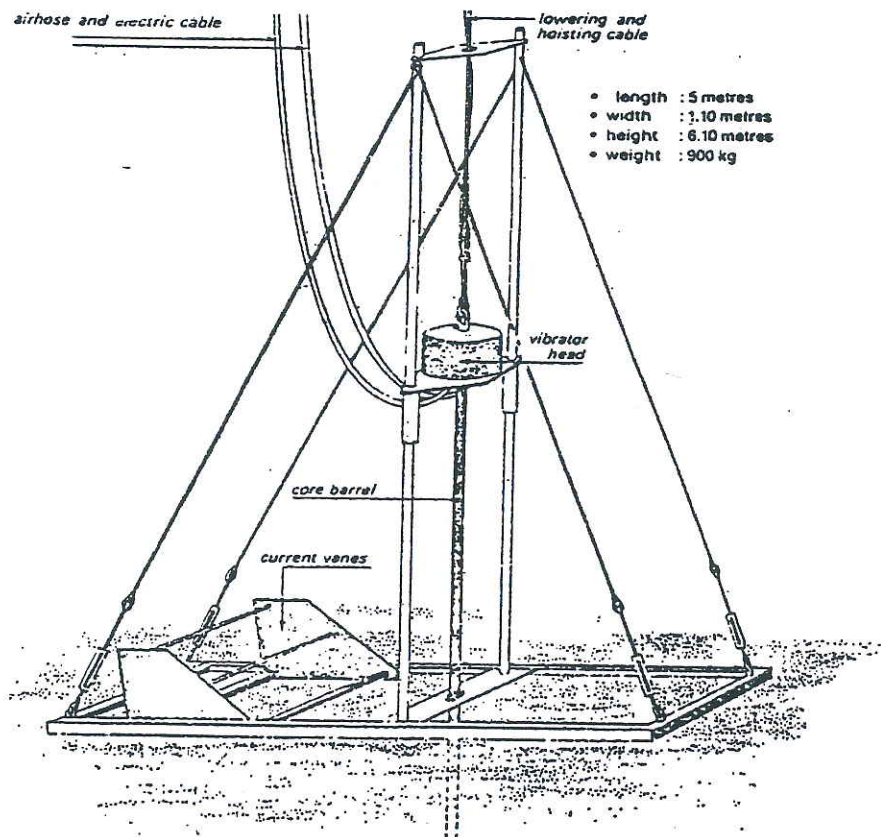
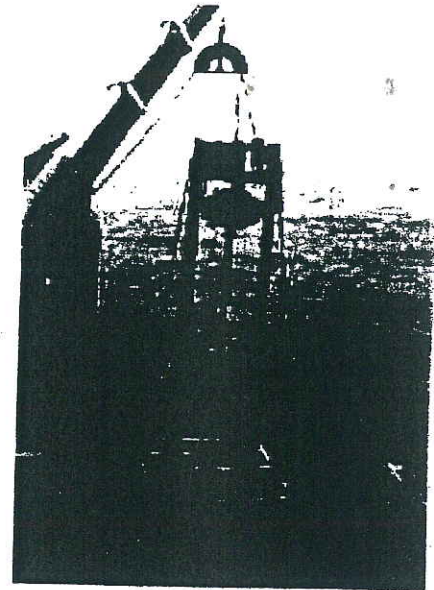
Core barrels  
- length: 5.25 m  
- diameter: 70 mm

Maximum working depth  
- approx 250 m

Maximum penetration seabed  
- 5 metres, depending on nature of soils

Required power supply  
- 220/380 V AC, 3-phase 7 K.V.A.  
The required electric power and air pressure can be supplied by a diesel generator and compressor set mounted on deck of the survey vessel.

Approximate dimensions  
- length: 5 m  
- width: 1.10 m  
- height: 6.10 m  
- weight: 900 kg



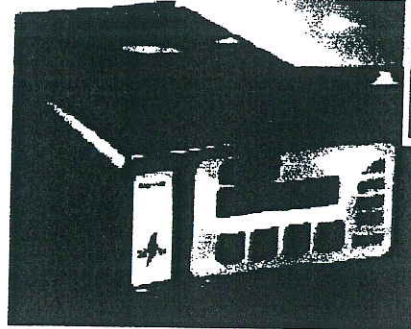
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## RADIO POSITIONING SYSTEM

SkyFix Spot



Racal's SkyFix unit is a fully integrated wide area DGPS system providing the user with easy access to all the advantages of Racal's high power, spot beam satellite Differential GPS services world-wide. L-Band operation and an extensive reference station infrastructure deliver accurate and high quality DGPS data direct to the user making SkyFix Spot suitable for many offshore applications.

### SKYFIX SPOT RECEIVER FEATURES

- Professional low powered, compact receiver
- High immunity to atmospheric and electrical noise and interference
- Accurate location, precise speed over ground and excellent repeatability
- Designed as a stand alone 'black box' positioning system or as a RTCM decoder unit for use with an existing GPS receiver
- Compatible with industry standard RTCM SC 104 V2
- Output conforms to marine standard NMEA 0183
- Easily interfaced to differential capable GPS receivers
- Compatible with all SkyFix Spot networks world-wide
- Small antenna within a marine housing
- Straight forward, easy to use, 4-button user control with back lit display.

### Configurations and Applications

The SkyFix Spot DGPS receiver is produced by Racal Survey for use with its international StaFix differential GPS networks. The easy to use, low power unit is designed as a high accuracy, 'black box' positioning system for offshore applications. It is possible to connect SkyFix Spot to existing compatible GPS receiver enhancing and improving performance while still maintaining operating familiarity.

SkyFix Spot comes with an active Virtual Reference Station (VRS) and 12 channel survey grade GPS receiver as standard with message output in NMEA dat string format. decoder for interfacing with any RTCM SC104 (V2) capable GPS receiver. Accuracies of better than 1 expected depending on the geometry of the network.

The SkyFix Spot receiver is controlled via simple menu-based commands, structured for ease of operation. Correction data is output in the NMEA position data message or RTCM SC104 (V2) format. System performance and diagnostic information is output through one of four RS232 ports for system test and monitoring.

The signal licence fees enable use within a complete spot beam area. Optional coverage in other areas is available.

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## RADIO POSITIONING SYSTEM

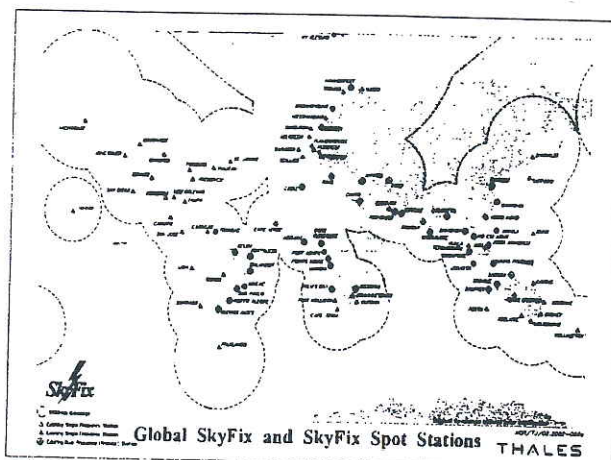
SkyFix Spot

### Physical Characteristics

<b>Size:</b> 75mmH	Receiver (standalone unit) 260mmD x 150mmW x (10.24inD x 5.91inW x 2.95inH)
	Standard antenna (AD285) 55 mm dia x 120mm H (2.17in dia x 4.72in H)
	Marine Housing 170mm dia x 100mm H (6.69in dia x 3.94mm H)
<b>Weight:</b>	1.5kg including GPS
<b>Operating Temp:</b> Receiver Antenna unit	0 to 50 deg C, 32 to +120 deg F -35 to +70 deg C, -30 to +150 deg F

### Technical Specification

<b>SkyFix Spot Receiver</b> RS422)	NMEA position output (GPS option) Independent RTCM SC104 ver. 2.0 RS232 (optional outputs) SkyFix Spot System messages included in RTCM output (*type 16 messages) RS232 ASCII output for connection to printer Message update rate typically 4 seconds Acquisition time from switch on typically < 20 seconds Re-acquisition time typically < 1 seconds
<b>Frequency band:</b>	1525 MHz to 1559 MHz Mobile Satellite Service Band
<b>Data Output Rate</b>	600, 1200, 2400, 4800, 9600 baud
<b>GPS receiver</b>	12 channel survey grade GPS receiver
<b>Power</b>	SkyFix Spot receiver - 7W SkyFix Spot receiver+ GPS - 9.5W typical



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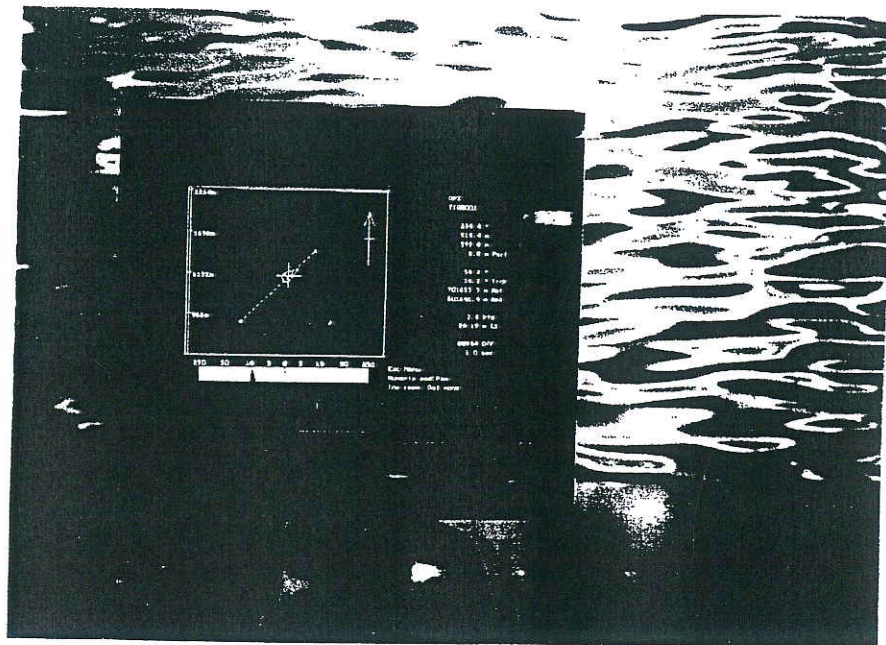
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EQUIPMENT



## HYDROGRAPHIC SURVEY SOFTWARE

Hydro



*Convenience, confidence, cost effectiveness for the hydrographic surveyor.*

As a totally integrated field-to-finish hydrographic survey product, the HYDRO system offers top-quality performance coupled with speed and efficiency. Its high level of integration ensures a minimum turnaround time from field to finished plots. A special feature is the system's ability to accept data from a variety of sources, including both stand-alone and differential GPS, surface and sub-surface positioning systems (ROV), echo-sounders, compasses and other types of sensors. And because it can monitor two positioning systems simultaneously, quality control in seismic surveys is greatly enhanced. Differential positioning accuracy is also considerably improved, as the HYDRO system has the capacity to record and merge raw Trimble GPS data with data from a GPS base station. This is carried out by using the Post-Nav II software. By merging the processed data neatly into the database, positioning accuracy is improved and the need for real-time telemetry can be eliminated. Editing of hydrographic data is easier, too, with fully interactive graphic screens allowing the user to carry out tide reduction, recalculation of position and sounding selection rapidly and simply. The HYDRO system's ability to support user-defined grid types, plot forms and the main measurement units makes the presentation of plots a straightforward matter, with visually impressive results. The remarkable flexibility of the system means that contours can be formed quickly and accurately, while profiles and sections of the surveyed lines can be readily plotted, aided by interpolation from the ground model if required. It also offers the user a choice of calculating volumes by end areas or between two surfaces. This PC-based product bears the assurance of quality that has made Trimble a world leader in the survey market. The HYDRO system – the logical choice.

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## HYDROGRAPHIC SURVEY SOFTWARE

Hydro

### APPLICATIONS

- Seismic & geophysical surveys
- Hydrographic charting & dredging volumes
- Wreck searches
- Airborne geophysical surveys

### PERFORMANCE FEATURES

- Logs up to 10 soundings per second
- Permits on-line datum transformation and projections for GPS
- Features on-line plotting, printing and annotation
- Supports UTM, TM, Lambert & Skew projections
- Offers interactive graphic control throughout editing
- Reprocesses positioning data quickly and simply
- Controls for sounding selection and overplot
- Contours up to 20,000 points
- Allows profile & cross-section plotting
- Calculates volumes by end areas or between 2 surfaces
- Interfaces with AutoCAD and GIS systems
- Comes with a comprehensive, user-friendly manual

### HARDWARE REQUIREMENTS

#### **Computer**

IBM PC or compatible with at least 640k RAM  
Serial & parallel port (For optimum performance, we recommend an 80386 processor with 4Mb RAM)

#### **Graphics**

EGA or VGA

#### **Plotters**

Most serial plotters with HPGL

#### **Pointing Devices**

Microsoft or Mouse Systems mouse

#### **Printers**

Most types with a Centronics interface

#### **Serial Interface**

AST compatible 4 Port serial card (optional)

#### **Helmsman Display**

Monochrome Hercules card & k monochrome TTL monitor (optional)

EQUIPMENT DATA

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## HYDROGRAPHIC SURVEY SOFTWARE

Hydro

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### INTERFACING CAPABILITIES

#### GPS

Trimble receivers including 4000DL & those with NMEA 0183

#### Other Positioning

Del Norte, Microfix, ARGO, Hyperfix, Syledis, Geodimeter, TracPoint II, Simrad HPR

#### Echosounders

Odom, Raytheon, Simrad, Atlas Deso, Innerspace

#### COMPASSES

Gyro & fluxgate, NMEA 0183

#### Serial output

User-defined output to devices such as Side Scan Sonar and other PC's.

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## SEZIONE 6. ELABORATO TECNICO



11-09

# Livello 0-20







**Livello 90-110**



**Livello 130-150**

PUNTI cm	PARAMENTI	Unità di misura	10bis-11-19	20-12	4bis-13-21	5bis-22	14bis-6	1bis-7	2bis-63/1	37-28	13-150	
			03020312	03020307	03020308	03020315	03020311	03020333	03020310	03020314	03020313	
Caratteristiche organolettiche			sui generis									
Stato fisico			fangoso palabile									
Colore			grigio									
Concrezioni o materiali grossolani			presenza di alcuni esoscheletri calcarei									
Peso specifico			Kg/dm3									
Residuo secco			%									
Umidità (da residuo secco)			%									
Azoto totale come N			mg/kg s.s.									
Fosforo come P			mg/kg s.s.									
Idrocarburi totali			mg/kg s.s.									
PCB			mg/kg s.s.									
Sostanza organica totale			% p.s.s.									
Argilla (partic. diam. ≤ 2µm)			% p.s.s.									
Limo (partic. diam. > 2 e ≤ 50 µm)			% p.s.s.									
Sabbia (partic. diam. > 50 e ≤ 2000 µm)			% p.s.s.									
Benzo-a-Antracene			mg/kg s.s.									
Crisene			mg/kg s.s.									
Benzo-b-Fluorantene			mg/kg s.s.									
Benzo-j-Fluorantene			mg/kg s.s.									
Benzo-k-Fluorantene			mg/kg s.s.									
Benzo-a-Pirene			mg/kg s.s.									
Dibenzo (a,h) antracene			mg/kg s.s.									
Benzo (ghi) Perilene			mg/kg s.s.									
Alpha-BHC			mg/kg s.s.									
Decachlorobiphenyl			mg/kg s.s.									
Dieldrin			mg/kg s.s.									
Endosulfan I (Alpha)			mg/kg s.s.									
Endrin			mg/kg s.s.									
Gamma-BHC			mg/kg s.s.									
Heptachlor			mg/kg s.s.									
Methoxychlor			mg/kg s.s.									
2,4,5,6-Tetrachloro-M-Xylene			mg/kg s.s.									
4,4'-DDD			mg/kg s.s.									
4,4'-DDT			mg/kg s.s.									
Alluminio come Al			% p.s.s.									
Antimonio come Sb			mg/kg s.s.									
Argento come Ag			mg/kg s.s.									
Arsenico cor. As			mg/kg s.s.									
Bario come Ba			mg/kg s.s.									
Berillio come Be			mg/kg s.s.									
Boro come B			mg/kg s.s.									
Cadmio come Cd			mg/kg s.s.									
Calcio come Ca			mg/kg s.s.									
Cobalto come Co			% p.s.s.									
Cromo VI come Cr			mg/kg s.s.									
Cromo totale come Cr			mg/kg s.s.									
Ferro come Fe			% p.s.s.									
Magnesio come Mg			mg/kg s.s.									
Manganese come Mn			mg/kg s.s.									
Mercurio come Hg			mg/kg s.s.									
Nichel come Ni			mg/kg s.s.									
Piombo come Pb			mg/kg s.s.									
Rame totale come Cu			mg/kg s.s.									
Selenio come Se			mg/kg s.s.									
Stagno come Sn			mg/kg s.s.									
Tallio come Tl			mg/kg s.s.									
Tellurio come Te			mg/kg s.s.									
Vanadio come V			mg/kg s.s.									
Zinco come Zn			mg/kg s.s.									
Coliformi totali			MPN/g									
Coliformi fecali			MPN/g									
Streptococchi fecali			MPN/g									
Salmonelle			MPN/g									
Spore di clostridi solfito riduttori			MPN/g									
pH finale			pH									
Antimonio			mg/l									
Arsenico			mg/l									
Berillio			mg/l									
Cadmio			mg/l									
Cromo VI			mg/l									
Mercurio			mg/l									
Piombo			mg/l									
Rame			mg/l									
Selenio			mg/l									
Tallio			mg/l									
Tellurio			mg/l									



PROVINCIA	MUNICIPALITÀ	N. CANTIERE	CANTIERE										
			15-24	16-8	3ter-9-17	34/1-25-34/3	26-35/1-43bis	48-41-55/1	42/2-42/3	49/3-49/1	14-130-150	56-57	58/1-59/1
			Caratteristiche organolettiche										
			Stato fisico										
			Colore										
			Concrezioni o materiali grossolani										
			Peso specifico										
			Residuo secco										
			Umidità (da residuo secco)										
			Azoto totale come N										
			Fosforo come P										
			Idrocarburi totali										
			PCB										
			Sostanza organica totale										
			Argilla (partic. diam. ≤ 2 μm)										
			Limo (partic. diam. > 2 e ≤ 50 μm)										
			Sabbia (partic. diam. > 50 e ≤ 2000 μm)										
			Benzo-a-Antracene										
			Crisene										
			Benzo-b-Fluorantene										
			Benzo-j-Fluorantene										
			Benzo-k-Fluorantene										
			Benzo-a-Pirene										
			Dibenzo (a,h) antracene										
			Benzo (ghi) Perilene										
			Alpha-BHC										
			Decachlorobiphenyl										
			Dieldrin										
			Endosulfan I (Alpha)										
			Endrin										
			Gamma-BHC										
			Heptachlor										
			Methoxychlor										
			2,4,5,6-Tetrachloro-M-Xylene										
			4,4'-DDD										
			4,4'-DDT										
			Alluminio come Al										
			Antimonio come Sb										
			Argento come Ag										
			Arsenico come As										
			Bario come Ba										
			Berillio come Be										
			Boro come B										
			Cadmio come Cd										
			Calcio come Ca										
			Cobalto come Co										
			Cromo VI come Cr										
			Cromo totale come Cr										
			Ferro come Fe										
			Magnesio come Mg										
			Manganese come Mn										
			Mercurio come Hg										
			Nichel come Ni										
			Piombo come Pb										
			Rame totale come Cu										
			Selenio come Se										
			Stagno come Sn										
			Tallio come Tl										
			Tellurio come Te										
			Vanadio come V										
			Zinco come Zn										
			Coliformi totali										
			Coliformi fecali										
			Streptococchi fecali										
			Salmonelle										
			Spore di clostridi solfito riduttori										
			pH finale										
			Antimonio										
			Arsenico										
			Berillio										
			Cadmio										
			Cromo VI										
			Mercurio										
			Piombo										
			Rame										
			Selenio										
			Stagno										
			Tellurio										
			Vanadio										
			Zinco										

**Livello 180-200**



**Livello 0-20**

Table with columns for levels (Liv. 0-20, 10bis-11-19, 20-12, 4bis-13-21, 5bis-22, 14bis-6, 1bis-7, 2bis-63/1, 37-28, 38-29, 39-30) and rows for various parameters including organoleptic characteristics, physical state, color, grossolani materials, specific weight, moisture, nutrients (N, P), PCBs, organic substances, heavy metals (As, Pb, Cd, Hg, Cu, Zn, Ni, Cr, Co, Mn, Fe, Al, Sb, Ag, As, Ba, Be, B, Ca, Cd, Co, Cr, Cu, Se, Sn, Ti, Te, V, Zn), pesticides (BHC, Dieldrin, Endosulfan, etc.), microbiology (coliforms, fecal streptococci, salmonella, clostridia), and pH.



