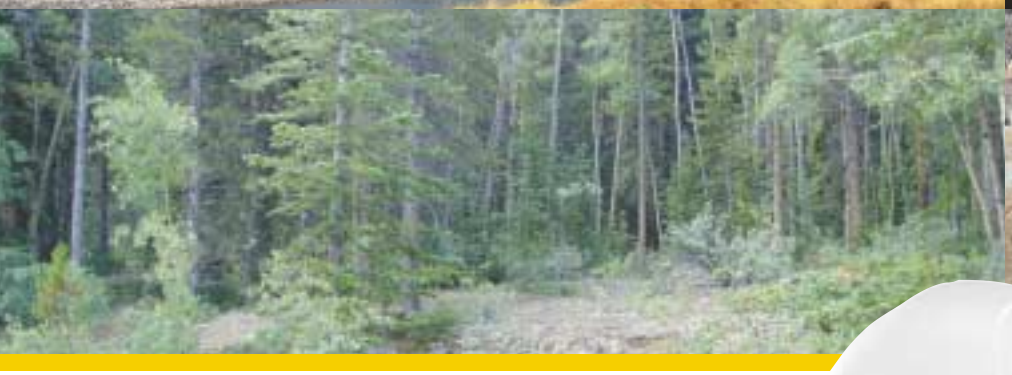
DGPS MAX

Feature-packed sub-meter GPS positioning



DGPS MAX

- Receives GPS, SBAS, OmniSTAR, and beacon signals
- Automatic dual channel SBAS tracking for more reliable reception
- Sub-meter positioning at rates of up to 5 Hz
- Raw measurement data for post-processing applications
- COAST™ technology allows use of corrections for up to 40 minutes without significant performance loss
- Easy configuration using the Setup Wizard
- User-defined profiles save receiver configurations for later use

ESRI Technology
AUTHORIZED BUSINESS PARTNER

csi wireless™
www.csi-wireless.com

DGPS MAX

Feature-packed sub-meter GPS positioning

GPS Sensor Specifications

Receiver Type:	L1, C/A code, with carrier phase smoothing
Channels:	12-channel, parallel tracking (10-channel when tracking WAAS)
WAAS Tracking:	2-channel, parallel tracking
Update Rate:	1 Hz default, 5 Hz max
Horizontal Accuracy:	<1 m 95% confidence (DGPS*) <5 m 95% confidence** (autonomous, no SA)
Cold Start:	1 min typical
Antenna Input Impedance:	50 Ω

L-band Sensor Specifications

Frequency Range:	1525 to 1559 MHz
Sensitivity:	-120 dBm for $<10^{-3}$ BER
Tuning Mode:	Manual or automatic
Adjacent Channel Rejection:	50 kHz spacing >25 dB, 1 MHz spacing >60 dB

Beacon Sensor Specifications

Channels:	2-channel, parallel tracking
Frequency Range:	283.5 to 325 kHz
Channel Spacing:	500 Hz
MSK Bit Rates:	50, 100, and 200 bps
Operating Modes:	Manual, automatic, semi-automatic
Cold Start Time:	< 1 minute typical
Reacquisition Time:	< 2 seconds typical
Demodulation:	Minimum shift keying (MSK)
Sensitivity:	2.5 µV/m for 6 dB SNR @ 200 bps
Dynamic Range:	100 dB
Frequency Offset:	± 8 Hz (~ 27 ppm)
Adjacent Channel Rejection:	61 dB ± 1 dB @ f_o ± 400 Hz

Communications

Serial ports:	1 full duplex, 1 RTCM input
Interface Level:	RS-232C
Baud Rates:	4800, 9600, 19200
CAN Bus:	CAN 2.0B
Correction Input / Output Protocol:	RTCM SC-104
Data Input / Output Protocol:	NMEA 0183
Raw Measurement Data:	Proprietary binary (RINEX utility available)
Timing Output:	1 PPS (HCMOS, active high, rising edge sync, 10 kΩ, 10 pF load)
Event Marker Input:	HCMOS, active low, falling edge sync,10 kΩ, 10 pF load

Environmental

Operating Temperature:	-32°C to +74°C
Storage Temperature:	-40°C to +85°C
Humidity:	95% non-condensing
EMC:	FCC Part 15, Subpart B, Class B CISPR 22

Power

Input Voltage Range:	9.2 to 48 VDC
Reverse Polarity Protection:	Yes
Power Consumption:	< 4.8 W
Current Consumption:	< 400 mA @ 12 VDC
Load Dump Protection:	Up to 86 VDC
Antenna Voltage Output:	5 VDC
Antenna Short Circuit Protection:	Yes

Mechanical

Enclosure:	Powder-coated aluminum
Dimensions:	203 mm L x 125 mm W x 51 mm H (8.0" L x 4.9" W x 2.0" H)
Weight:	0.80 kg (1.76 lb)
Display:	2-line x 16-character LCD
Keypad:	3-button
Power Switch:	Push-button
Power Connector:	2-pin miniature
Data Connector:	DB9-socket
Antenna Connector:	TNC-socket

Pin-out

Main Port

Pin 2	Transmit data (TXD)
Pin 3	Receive data (RXD)
Pin 5	Signal ground

RTCM Input Port

Pin 2	Transmit data (TXD)
Pin 3	Receive data (RXD)
Pin 5	Signal ground
Pin 6	Event marker input
Pin 9	1 PPS

CDA-3 Antenna

GPS Freq. Range:	L1 (1575 MHz ± 20 MHz)
GPS LNA Gain:	27 dB
L-band Freq. Range:	1525 to 1585 MHz
L-band LNA Gain:	28 dB
Beacon Freq. Range:	283.5 to 325 kHz
Beacon LNA Gain:	34 dB
Dimensions:	141 mm dia x 127 mm H (5.57" dia 5.00" H)
Weight:	0.478 kg (1.1 lb)
Antenna Connector:	TNC-socket
Enclosure:	polycarbonate
Mounting Thread:	1-14-UNS-2B
Input Voltage:	5.0 to 15.0 VDC
Input Current:	50 to 60 mA
Operating Temp.:	-40°C to +85°C
Storage Temp.:	-40°C to +85°C
Relative Humidity:	100% condensing

* SVs > 5, HDOP < 2, RTCM SC-104 correction data from a dual frequency reference station, short baseline, and low multipath environment.

** Dependent upon ionospheric activity and multipath

Warranty: Each CSI Wireless product is covered by a limited one-year warranty on parts and labor.

CSI Wireless Dealer

Avery label #05260 (laser print)

Printed in Canada.

csi wireless™

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GeoPulse
Boomer/Sparker Profiling System

Introduction

The GeoPulse boomer system is widely accepted by the marine geophysical community as the best option for high resolution, deep penetration profiling in both deep ocean and shallow coastal environments. Industry proven, with thousands of kilometres surveyed, GeoPulse offers a flexible high resolution solution. The system provides up to three times the acoustic energy of conventional profiling systems while operating in very shallow water and in high noise environments. The surface towed acoustic source is easy to deploy and the on-board units are compact and easily installed. For surveys where even greater penetration is required, the GeoPulse Multi-Electrode Sparker Array may be used in place of the Boomer plate, but at the expense of some trade-off in resolution.

Basic System

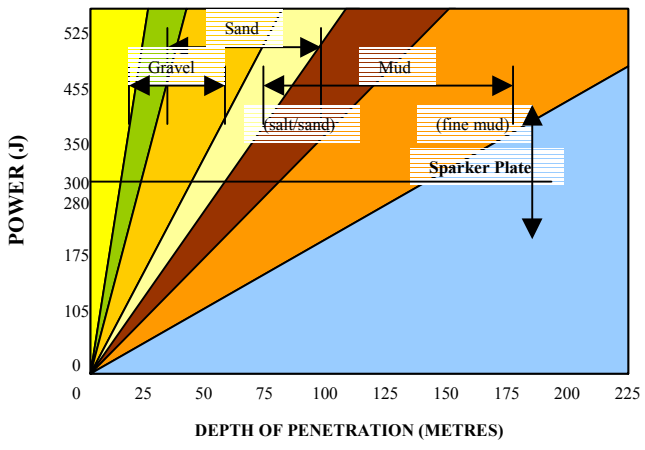
- **GeoPulse 5420S Solid State Power Supply**
  The GeoPulse 5420S employs a solid state high voltage switching device which offers significant advances over the older technology, including higher efficiency, very high reliability and excellent repeatability. The GeoPulse 5420S is controlled entirely from the front panel, making it very easy to operate, and incorporates the high level of safety features you would expect from a GeoAcoustics product.
- A specially designed Power Cable is used to connect 5420S to the source.
- An acoustic source which can be either a **Boomer plate (Model 5813B)** mounted on a **Catamaran (Model 5812A)** or a **Multi-Electrode Sparker Array**.
  The GeoPulse sound source produces a high energy pulse by the action of a unique vacuum controlled electromechanical "plate". The vacuum controls the degree of damping and ensures a repeatable, high energy signature. The characteristic output of the sound source gives much improved resolution over conventional systems and up to ten times the seabed penetration of standard "pinger" profiler systems.
- **GeoPulse Receiver (Model 5210A)**, usually with a **Swell Filter Option** fitted.
  The Receiver unit receives the acoustic return from the hydrophone. It combines in one compact and easily operated unit, the essential processing and control functions for analogue data enhancement and simple interface to any industry standard graphic recorder.
- **GeoPulse Hydrophone (Model 5110A)**
  The GeoPulse hydrophone array receives the returned signals. The hydrophone contains twenty elements and is designed for maximum durability in offshore conditions.

Data from the GeoPulse Receiver can be displayed directly onto a wide variety of industry standard graphic recorders. Alternatively the GeoPulse Receiver may be omitted, and the output from the GeoPulse Hydrophone may be fed directly into a GeoPro Sonar Processor for recording and processing.

Features

- Deep penetration in wide variety of sub-bottom structures.
- Easy to operate and install.
- Good shallow water performance.
- Deployed by one-two people.
- Proven offshore track record.
- Higher source levels enable operation in water depths to 500m.
- Rugged and reliable.
- Good performance in high noise environments.
- Cost effective solution.

Expected Penetration from GeoPulse™



Specifications

Receiver Model 5210A

Amplifier:	Differential common mode rejection: 100dB at 60Hz. Sensitivity 30µV RMS in, produces 1V RMS out at 90dB total gain with TVG.
Signal to noise:	20dB at 100dB gain 1kHz centre frequency and 1kHz bandwidth.
Coarse gain:	40dB maximum.
Fine gain:	0 – 30dB in 3dB increments.
Filter:	Low pass and high pass, active type, maximally flat, 24dB/octave minimum roll-off, 0 gain, 0.02kHz to 15kHz adjustable in ½ octave increments. Knobs interlock to prevent overlap.
TVG:	Dynamic range: 30dB Rate: approximately flat to 30dB in 14ms. Manual delay: vernier adjust from 1 to 14ms with multiplier of x 1, x 10, x 100 and internal select of x 1000.
AGC:	Attack and decay adjustable from 330µs to 330ms. Range: 20dB
Power:	115/230VAC ± 10% (internal switch selectable), 47 to 63Hz, 45W.
Environmental:	Operational: -5 to 50°C, Storage: -15 to 85°C
Dimensions:	45.7cm (L), x 43cm (W), x 17.8cm (H), 12kg.

Solid State Power Supply Model 5420S

Dimensions:	60 cm (W) x 41cm (D) x 39 cm (H)
Weight:	83kg
Power:	Input Voltage: 115 Vac/230Vac 50/60 Hz. Output Voltage: 3750 Vdc nominal. Output Energy: Switch selectable 105J, 175J, 280J, 350J & 455J.
Energy Storage:	Capacitance: C1 C2 C3 15µF 25µF 25µF
Charging Power:	910W Max.
Environmental:	Operational: 0 to 50°C Storage: -15°C to 65°C
Connections	
Power In:	25A 3 pin panel mounted.
Power Out:	HV panel mounted connector with safety interlock.
Key Input:	CMOS/TTL & optical fibre on front panel.

Sound Source Model 5813B

Source Level:	227dB re 1µPa @ 1m at 280 joules
Pulse Length:	<0.2msec
Max input Energy:	280 joules
Max input voltage:	4kV
Weight:	12.5kg
Dimensions:	38.3cm (W) x 41.5cm (D) x 4.3cm (H)

Multi Tip Sparker

Energy Level:	150 to 500 watt-secs (60 Tips) 150 to 1000 watt-secs (144 Tips)
Repetition Rate:	2 pulses per second (60 Tips) 1 pulse per second (144 Tips)
Dimensions:	60 Tips - 30 (H) x 5 (W) x 100 cms (L) 144 Tips – 30 (H) x 5 (W) x 226 cms (L)
Weight:	6kg (60 Tips) 8kg (144 Tips)
Max Towing Speed:	5 knots

Hydrophone Model 5110A

Elements:	20
Sensitivity:	-202dB re 1V/µPa
Response:	+0.5dB from 5Hz to 3kHz, +2dB – 10kHz.
Preamplifier:	Gain: +24dB Power: 9-12VDC @ 4mA Response: 5Hz to 20kHz + 1dB
Dimensions:	2.5cm (Diameter) x 7.62m (L)
Weight:	12kg
Hydrophone array	Breaking strength: 454kg
Cable:	Length (5110A-164): 60m

Catamaran Model 5812A

Surface tow with 2 towing/steering lines
PVC floats with stainless steel frame.

Speed:	To 5 knots
Size:	132cm (W) x 87cm (D) x 28cm (H).
Weight:	26kg

Receiver Model 5210A Options

The **Preamp Power Supply** is a plug-in option to the 5210A. The unit also contains an output current sensing circuit so that, if an overload occurs, it can drive external LEDs to show supply status.

Output:	voltage 0 (off), 6, 8, 12 or 24 VDC ± 0.5 VDC, switch selectable; current 30mA maximum overload protected.

The **Model 5212A swell filter** is a field installable option for the model 5210A. It can be used either in situ or with tape recorded records for post processing of data to remove the effects of vessel or hydrophone vertical motion on sub-bottom data.

Maximum frequency:	7.5 or 15kHz (switch selectable)
Bottom averaging time:	2-40 seconds
Operation modes:	1) manual signal gate 2) automatic tracking Signal gate – return to manual with bottom signal loss.
Maximum Heave:	Approx ± 5.5m
Maximum Memory Period/trace:	960ms at 7.5kHz, 480ms at 15kHz
Depth Resolution:	Approx 8cm
Maximum Depth:	(without key delay) approx 720m at 7.5kHz, approx 360m at 15kHz.

Specification sheet subject to change without notice.
(9-Boomer-6900/A 01/2000)

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MODEL 1086NT Series 2000
THERMAL NETWORK PRINTER

The EPC Model 1086NT is latest advancement in thermal printing technology. Building on EPC's proven GSP-1086 architecture, the 1086NT integrates networking capabilities for data input and output, and remote control applications.

Configured as TCP/IP host, the recorder exposes a simple socket interface to receive data and commands over a LAN or Internet connection. Full access to the unit's vast command set is provided through a high-level programming interface (API). This greatly reduces system interfacing costs by giving the system integrator an out-of-the-box solution that takes hours to implement instead of days.

As a client, the 1086NT easily connects to Windows[tm] based networks to log digitized data to a server's disk. A simple playback mechanism then allows the user to review any part of the previously collected data set — with or without fixes, events, and annotation. The XTF file format ensures compatibility with all modern processing systems.

Like its predecessor, the 1086NT also interfaces to virtually any analog based system. With signal processing features such as slant range correction, TVG, and bandpass filtering, the unit is a total real-time data acquisition solution. Include the high speed parallel interface and the integrated NAV input, and there is simply no printer in the industry that has this much capability.

EPC LABORATORIES INC., 8 Perry Way, Newburyport, MA 01950 USA PHONE: (978) 462-1900
FAX: (978) 462-9960 EMAIL: sales@epclabs.com WEB: http://www.epclabs.com

HARDWARE

Host Processor
Pentium Class
CPU Bus
PC/104 Bolt-down
Control Panel
Sealed membrane type, software defined
Displays
Twin 2x40 LCD displays with LED backlights

POWER

Power Supply
400 Watt, auto-sensing, universal input
84-265 VAC, 50-60 Hz
Power Consumption
80 Watts non-printing
130 Watts Peak

PHYSICAL

Dimensions & Weight
17.6"W x 19.3"H x 6.7"D
50 LBS.
Media
Heat sensitive thermal paper or high grade
Plastic film - 23dB dynamic range
Paper Length: 150 feet
Film Length: 130 feet
Temperature (non-condensing)
0°C to 65°C - Operating
-28°C to 65°C - Storage

PRINTING

Gray Levels & Resolution
Selectable: 8, 16,32, 64 Levels
Printhead: 2048 Pixels @ 203 DPI
Chart Speeds (Lines Per Inch)
Fixed: 80, 100, 120,150, 200, 240, 300
Variable: Speed Correction input from GPRMC GPS string.

SIGNAL PROCESSING

Time Varied Gain
100 Logarithmic curves to choose from
Band Pass Filtering
Low Pass: 1 kHz to 25 kHz
High Pass: 40 Hz to 1 kHz
Slant Range Correction & Bottom Tracking

ANNOTATION

128 Character ASCII Alphanumerics
Automatic or manual fixes, messages and events based on line intervals
Automatic annotation feature on settings changes

ANALOG INTERFACE

Dual Signal Input
-10V to 10V SIGNAL BNC inputs
(2KΩ Input Impedance)
External Trigger Input (slave)
TTL EXT TRIG BNC input with slope sense
Internal Key Output (master)
TTL KEY OUT BNC with polarity selection
(256us pulse width)
Gain, Threshold, Polarity
Independent controls for each channel
Minimum printable signal 150 mV
Time Bases
560 kHz A/Ds with 16 Bit resolution
Scan - 5 mS to 10 secs, 1 ms resolution
Key - 5 mS to 10 secs, 1 ms resolution
Delay - 0 secs to 8 secs, 1 ms resolution

PARALLEL INTERFACE

Interconnect
25 Pin Sub D, metal shell
Data Input (Pins 2-9)
Eight Bit Centronics Compatible
2048 bytes per raster line
White = 0X00; Black = selectable
Handshake
Low Active host/STB on Pin 1
Low Active printer/ACK on Pin 10
High Active printer BUSY on Pin 11
Burst Rate Bandwidth: Over 1 MHz
Sustained Bandwidth: Based on gray levels

ETHERNET INTERFACE

Interconnect
RJ45 10/100 front panel connection
Data Input
High-level Socket Interface with API provided, TCP/IP Protocol

COMMAND INTERFACE

QWERTY Keyboard, Socket, or RS-232 with selectable Baud Rates (DCE, Null Modem Required for PC Conn.).
All panel functions remotely accessible
On-line help facility prints command set

Warranty: One Year Limited Parts & Labor.

*Specification subject to change.

EPC LABORATORIES INC., 8 Perry Way, Newburyport, MA 01950 USA PHONE: (978) 462-1900
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APPLIED ACOUSTICS
Underwater Technology



: Technical Specification

CSP-D Seismic Energy Source

The CSP-D is a seismic energy source for boomer and sparker applications which has been developed from the proven CSP1500 and CSP2200 versions. Uprated to 2400 Joules and with a higher rated thyristor 'switch' the CSP-D sets the new industry standard.

The unit, with the same chassis and 1500J/second HV engine, is available in three variants; the CSP-D700, CSP-D1200 and the CSP-D2400. Additional settings allow for longer boomer pulse widths with the potential of more boomer seabed penetration.

CSP-D

Key Features

: Cutting edge power supply technology evolved from years of field use.

: Unique dual voltage output provides exceptional versatility.

: Contains proprietary Variable Input Power Circuitry (AVIP) enabling slow start to minimise marine mammal disturbance and operation from the smallest possible generator.

: Reliability and security with global after sales service and support from the world's leading seismic power source manufacturer.

: Contains proprietary pulse shaping circuitry for optimisation of high resolution boomer data.

: Meets EC emissions regulations enabling interference-free field and laboratory use.

: Additional safety/protection features including over current shut-down, Safety OFF button and key-switch operation.

: All settings externally selectable including voltage/output power increments from 50 to 2400J, dependant on model.

: LED fault indicators display Over-temperature, Low Input Voltage and Capacitor Fault warnings.

: High current and voltage solid state (semiconductor) discharge method.

: Supplied with robust transit case, H.V. junction box, mains lead and H.V. connector plug.

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PHYSICAL SPECIFICATION

Dimensions	Transit case (7U) with cover in place and handles flat: H 50cm x W 58cm x D 74cm
Weight	CSP-D, case and cover: Max 63.5kg (CSP-D2400 model)

ELECTRICAL SPECIFICATION

Mains Input	200 - 240 VAC. 115V Units available to order, 45-65Hz @ 3.0kVA Single Phase, 3 pin connector, Contains AVIP soft start circuitry to minimise marine mammal disturbance and reduce generator requirements
Voltage Output	2500 - 4000 volts DC, 4 pin interlocked connector, Solid state semi-conductor discharge method
Output Energy	Three models available. Externally selectable in Joules as follows:-
	CSP-D700 50;100;150;200;250;300;350;400;500;600;700
	CSP-D1200 50;100;150;200;250;300;350;400;450;500;550;600; 700;800;900;1000;1100;1200
	CSP-D2400 50;100;150;200;300;400;500;600;700;750;800;900; 1000;1250;1500;1750;2000;2250;2400
Charging Rate	1500J/second for continuous operation at 0 - 45°C ambient
Capacitance	240µf, 10^8 shot life
Trigger	+ve key opto isolated or closure set by front panel switch, BNC connector on front panel and remote box (optional)
Repetition Rate	6 pps maximum. To 5 pps at 300 Joules (or 1 pps at 1500J)
Earth	M8 stainless steel stud on front panel
Internal Design	A Modular approach allows for easy servicing and capacitor replacement (For safety reasons, only factory trained technicians should attempt a repair)

SAFETY FEATURES

Main electronic control circuits and secondary layer of safety circuitry
Specially designed HV connector with interlock
High speed dump resistors for high voltage components
Capacitor bleed resistors
Open circuit shutdown
Timer shutdown
Output current monitor & shutdown
Over temperature shut-down
Cover and connector interlocks
Remote control available for triggering and operation

COMPATIBILITY SOUND SOURCES

CSP-D700	AA200 and AA300 Boomer Plates, Squid 500 Sparker
CSP-D1200	As above plus Squid 2000 Sparker for high resolution operations
CSP-D2400	As above plus Squid 2000 Sparker and Delta Sparker

APPLIED ACOUSTICS
Underwater Technology



: Technical Specification

Streamer Hydrophones

High quality streamer hydrophones available as 1-8, 12 or 20 element designs. Each is supplied with a pre-amplifier and connectors for standard seismic acquisition systems.

Key Features

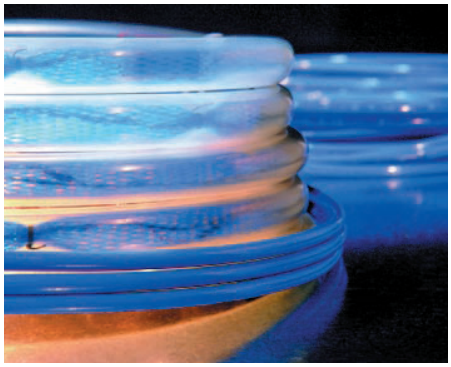
: Filled with Silicon oil for neutral buoyancy.

: Supplied with robust 50m tow leader as standard.

: Complete with pre-amp and easily replaceable alkaline battery.

: Extensively field proven for consistently high quality results.

: In addition to standard models, customised units with grouped elements can be supplied.



STREAMER HYDROPHONES

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PHYSICAL SPECIFICATION

Hydrophone Length	4.5 metres as standard
Hydrophone Diameter	25mm
Hydrophone Element Spacing	8 element variant, 365mm 12 element variant, 250mm 20 element variant, 150mm
Weight in Air (1 element)	5 kg
Weight in Air (8 element)	5 kg
Weight in Air (12 element)	6 kg
Weight in Air (20 element)	7.5 kg
Depth Rating	10 metres
Tow leader cable	50 metres, or length of choice

ELECTRICAL SPECIFICATION

Frequency Response (std)	145 Hz – 7 kHz (-3dB)
Overall Hydrophone Sensitivity (1 element)	-194dB ref 1v per µPa
Overall Hydrophone Sensitivity (8 element)	-176dB ref 1v per µPa
Overall Hydrophone Sensitivity (12 element)	-163dB ref 1v per µPa
Overall Hydrophone Sensitivity (20 element)	-167dB ref 1v per µPa

Supplied with user replaceable 9v alkaline battery (Duracell type MN 1604)

Registration No. U6447
BS: EN: ISO9001

APPLIED ACOUSTICS
Underwater Technology

Chirp III Acoustic Profiling System

GEOPHYSICAL

Redefining the Chirp advantage - Again Chirp III

Benthos is a pioneer in Chirp technology and was the first to bring a commercial Chirp sub-bottom profiling system to the market. Teledyne Benthos continues that advancement with the new Chirp III sub-bottom profiling system.

Portable and affordable, the Chirp III is a lightweight, low cost system ideally suited for small boats and small budgets. Its versatile system configuration has been designed to operate with a wide variety of tow vehicles and sound sources.

System configurations include:

- TTV-170 shallow water vehicle (to 600 meters)
- TTV-190 deep water vehicle (to 1000 meters)
- AUV configuration
- Hull mount configuration
- Low Frequency analog source (i.e. Boomer, Sparker)

Simultaneous Dual Frequency Operation

The Chirp III offers simultaneous dual-frequency operation which covers a wide spectrum of frequencies (2-7 kHz and 10-20 kHz). This choice of frequencies and selectable chirp bandwidths allows the operator to optimize the system configuration for sediment penetration and layer/object resolution.

Applications

- Offshore hazard surveys
- Pipeline and small object surveys
- Bridge piling scour and environmental surveys
- Mining and dredging

ACOUSTICS
FLOTATION
GEOPHYSICAL
HYDROPHONES
MODEMS
LOCATOR
ROBOTICS

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www.benthos.com

Chirp III Acoustic Profiling System

SPECIFICATIONS

Main Processor:	PC based sonar work station.
DSP Sonar Signal Processing:	Two DSP channels, 16 bit A/D, continuous FFT each transmission, each channel.
Data Storage:	Stores raw data in XTF format.
Operator Software:	Windows™ XP environment.
Display:	High resolution display.
Ping Rate:	15 pings/second maximum.
Pulse Length:	User selectable from 5 msec. to 50 msec. Pulse waveforms stored in memory.
Output Power:	4 KW each channel max.
Transducers:	AT-471, Chirp bands 2 to 7 kHz. AT-12D7, Chirp bands 10 to 20 kHz.
Cable:	Kevlar electrical umbilical cable.
Operating Depth:	TTV 170: 600M maximum. TTV-190: 1000M maximum.
Navigation/Annotation:	Nema 0183 interface, event/fix marks, external interrupt.
Hard Copy Recorder:	Grey scale graphic recorder (optional).
Operator Controls:	HW gain (dual channel) 0-42dB/channel; two stage TVG; bottom tracking (dual channel); smoothing; horizontal/vertical zoom; display gain control; repetition rate control; custom FM waveform design.
Operator Displays:	Bathymetry display; reflectivity and hardness display; signal to noise ratio display; voltage display; custom color palette selection; color rotation; navigation map display.
Dimensions and Weight:	
Shipboard enclosure:	20” wide x 15” high x 22” deep; weight–120 lbs.
Tow vehicle:	TTV 170: 18” O.D. x 24” long; weight in air–98 lbs., weight in water–80 lbs. TTV 190: 18” O.D. x 64” long; weight in air–300 lbs., weight in water–170 lbs.

Chirp III Software Features

- Chesapeake Sonar Map seismic software
- Windows XP operating system
- User defined ping rate
- Automatic bottom tracking
- Interactive horizon picking
- On the fly Chirp/CW pulse
- Simultaneous dual channel Chirp

Chirp III Hardware Features

- Simultaneous dual frequency operation allows for a choice of Chirp FM sweeps from 2 kHz to 20 kHz
- Flexible Chirp III acquisition/processing work station allows for versatile configurations including shallow and deep water vehicles, diverse hull mount arrays, AUV’s, and input from analog sources
- Ethernet output
- High power output -- up to 4KW each
- Integrated pressure sensor (optional)

TELEDYNE BENTHOS
A Teledyne Technologies Company

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Klein Associates, Inc.

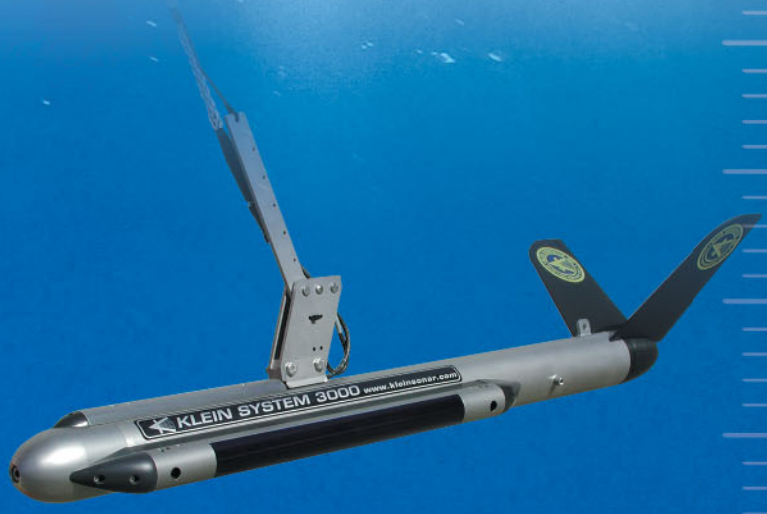
KLEIN SYSTEM 3000

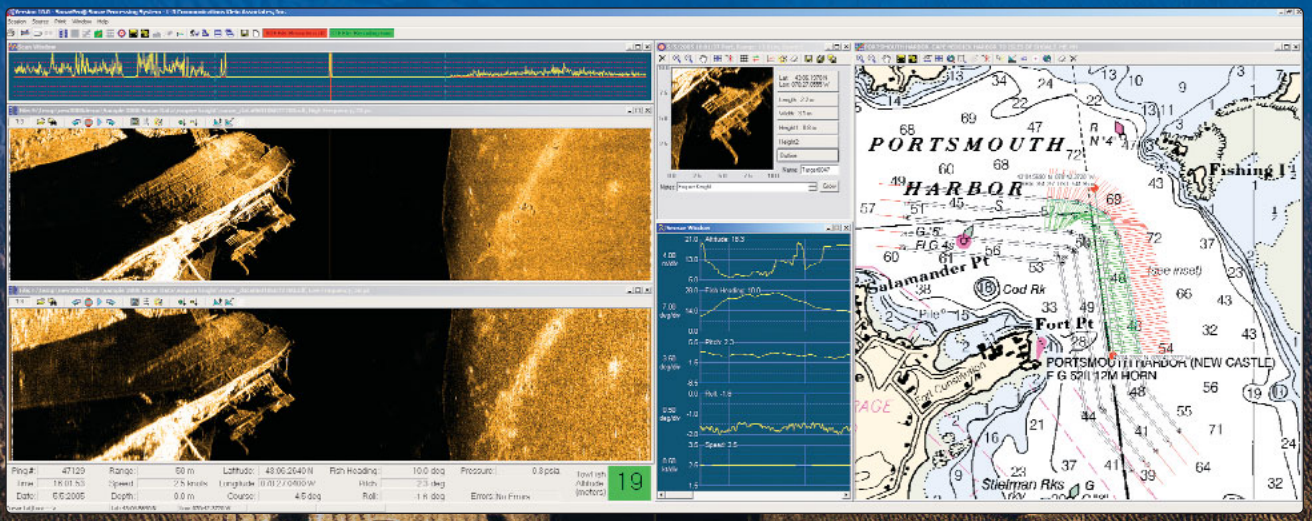
Digital Side Scan Sonar

The System 3000 System presents the latest technology in digital side scan sonar imaging. The simultaneous dual-frequency operation is based on new transducer designs, as well as the high-resolution circuitry recently developed for the Klein multi-beam focused sonar. The System 3000 performance and price is directed to the commercial, institutional and governmental markets.

KEY FEATURES

- Advanced signal processing and transducers produce superior imagery
- Cost-effective, affordable
- PC-based operation with SonarPro® software, dedicated to Klein sonars
- Small, lightweight and simple designs – easy to run and maintain
- Easily adapted to ROVs and custom towfish
- Meets IHO & NOAA Survey specifications





THE DIFFERENCE
IS IN THE IMAGE

L3

C³ISR > GOVERNMENT SERVICES > AM&M > SPECIALIZED PRODUCTS

Klein Associates, Inc.

KLEIN SYSTEM 3000

Digital Side Scan Sonar

Towfish Specifications	
Frequencies	100 kHz (132 kHz +/- 1% act) 500 kHz (445 kHz, +/- 1% act)
Transmission pulse	Tone burst, operator selectable from 25 to 400 µsecs. Independent pulse controls for each frequency
Beams: Horizontal Vertical	 0.7 deg. @ 100 kHz, 0.21 deg @ 500 kHz 40 deg
Beam tilt	5, 10, 15, 20, 25 degrees down, adjustable
Range scales	15 settings — 25 to 1,000 meters
Maximum range	600 meters @ 100 kHz 150 meters @ 500 kHz
Depth rating	1,500 meters standard, other options available
Construction	Stainless Steel
Body length	122 cm (48 in)
Body diameter	8.9 cm (3.5 in)
Weight (in air)	29 kg (63.9 lbs)
Standard sensors:	Roll, pitch, heading
Options	Magnetometer, pressure, acoustic positioning

Transceiver Processor Unit (TPU) Specifications	
Operating system	vxWorks® with custom application
Basic hardware	Standard 19-inch rack or table mount, VME bus structure
Outputs	100 Base-T_X, Ethernet LAN
Navigation input	NMEA 0183
Power (includes towfish)	120 watts @ 120/240 VAC, 50/60 Hz
Interfacing	Interfaces to all major sonar sata processors
Options	Splash-proof packaging option available

Tow Cable

Klein offers a selection of coaxial, Kevlar® reinforced, lightweight cables, double armored steel cables, and interfaces to fiber optic cables. All cables come fully terminated at the towfish end.

Klein Sonar Workstation Specifications	
Basic operating system	Windows NT®, 2000®, or equivalent
Sonar software	SonarPro®
Data format	SDF or XTF or both selectable
Data storage	Internal hard drive, CD/DVD-RW
Hardware	Industrial PC
Options	Optional waterproof laptops

SonarPro® Software

Custom developed software by users and for users of Klein side scan sonar systems operating on Windows NT®, 2000®. Field-proven for many years. SonarPro® is a modular package combining ease of use with advanced sonar features.

Basic modules	Main program, data display, information, target management, navigation, data recording & playing, and sensor display.
Multiple display windows	Permits multiple windows to view different features as well as targets in real time or in playback modes. Multi-windows for sonar channels, navigation, sensors, status monitors, targets, etc.
Survey design	Quick and easy survey set up with ability to change parameters, set tolerances, monitor actual coverage, and store settings.
Target management	Independent windows permitting mensuration, logging, comparisons, filing, classification, positioning, time & survey target layers, and feature enhancements. Locates target in navigation window.
Sensor window	Displays all sensors in several formats (includes some alarms) and responder set up to suit many frequencies and ping rates.
Networking	Permits multiple, real time processing workstations via a LAN including "master and slave" configurations.
"Wizards"	To help operator set up various manual and default parameters.
Data comparisons real time	Target and route comparisons to historical data.

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L3 communications
Klein Associates, Inc.

L-3. Headquartered in New York City, L-3 Communications employs over 64,000 people worldwide and is a prime contractor in aircraft modernization and maintenance, C³ISR (Command, Control, Communications, Intelligence, Surveillance and Reconnaissance) systems and government services. L-3 is also a leading provider of high technology products, subsystems and systems.