

PRODUCT CATALOG  
2012

# Geophysical

GEOPHYSICAL SURVEY DEVICES

## Survey, Explore, Discover

The geophysical product line offers customers a wide range of diverse applications and configurations to meet every survey need. Ranging from affordable, proven chirp technology to more elaborate professional grade C3D designs, Teledyne Benthos offers something for everyone in the geophysical field. The geophysical line is dedicated to inspection, data collection and survey in remote and challenging marine environments. These systems are ideal for fisheries, habitat mapping, engineering systems, object detection, ocean studies and are appealing to beginners as well as experienced geophysical professionals.



INNOVATIVE UNDERSEA SYSTEMS TECHNOLOGY



**TELEDYNE  
BENTHOS**

A Teledyne Technologies Company

**50** Years of  
Innovation  
1962-2012



# Teledyne Benthos Geophysical Product Line

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## Tow Vehicle

# C3D-TOW

## Side Scan Vehicle



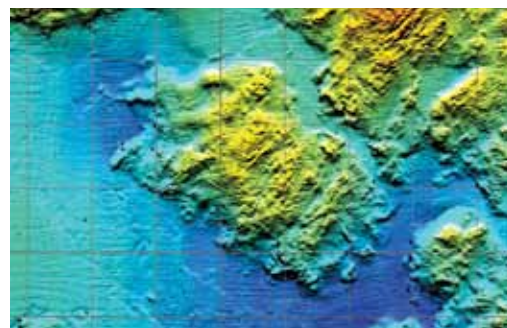
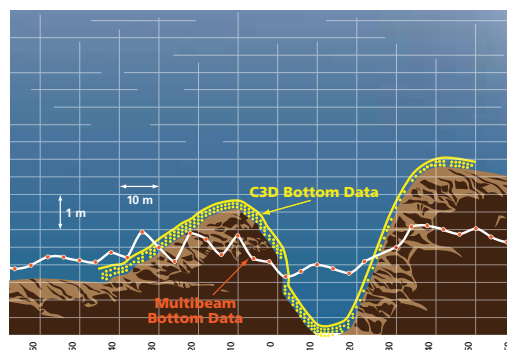
### C3D-TOW Vehicle Configuration

#### Side Scan - Bathymetry

The C3D system combines high-resolution imagery and wide swath bathymetry for bottom mapping, image interpretation, and a 3-dimensional look at the seafloor. It represents the latest in sonar imaging with patented technology under license from Simon Fraser University using a technique called CAATI (Computed Angle of Arrival Transient Imaging).\* This technique incorporates a multi-array transducer and is capable of solving for multiple angles-of-arrival, resulting in a more detailed view of the seafloor.

The C3D system provides efficiencies for surveyors by offering a wider swath and the combination of imagery, bathymetry and sub-layer data, in one sensor. The system is ideal for fisheries habitat mapping, port and harbor clearance, coastal studies, deep ocean mapping, cable route surveys, and mine countermeasures.

\*Under license from Simon Fraser University



### Applications

- Channel clearance studies
- Hydrographic charting
- Engineering and scientific studies
- Biomass for Fisheries
- Object detection
- Cable/pipeline route surveys
- Bridge inspection
- Bottom mapping
- Geology
- Mining

## Tow Vehicle

### C3D Tow Vehicle (Featuring Side Scan Sonar & Bathymetry)

The TTV-290 series of tow vehicles is designed for hydrodynamic stability in most side scan towing applications. The side scan transducer bays are designed to offer 20, 30, and 40 degrees downward looking positions for optimum performance in a variety of different applications. The stainless steel midplate construction gives users a rigid and stable platform to mount additional sensors. The high visibility yellow polyethylene covers are designed to handle years of use. These new and improved shells are more resistant to impact than earlier models, and are easy and cost effective to modify or replace.

### SUBSEA UNITS

#### TTV-296

##### C3D-TOW Vehicle **ADSL**

TTV-296 tow vehicle (ADSL) operates at 200 kHz and is designed for operations up to a 2000 meter depth with cable length up to 5000 meters at 5Mbits throughput. The standard vehicle is equipped with a motion reference unit and a Teledyne RDI Depth/CTD sensor. The TTV-296 offers (2) additional RS-232 communication ports with 12 and/or 24 VDC. These can be used to interface with a magnetometer, responder, and/or a high-resolution motion sensor.

#### TTV-297

##### C3D-TOW Vehicle **VDSL**

TTV-297 tow vehicle (VDSL) operates at 200 kHz and is designed for operations up to 1000 meter depth with cable length up to 1000 meters at 7.5Mbits throughput. The standard vehicle is equipped with a motion reference unit and a Teledyne RDI Depth/CTD sensor. The TTV-297 offers (2) additional RS-232 communication ports with 12 and/or 24 VDC. These can be used to interface with a magnetometer, responder, and / or a high-resolution motion sensor.



Dummy weight installed in bow of C3D Tow Vehicle



**C3D-Tow Vehicle**  
(Featuring Side Scan Sonar  
& Bathymetry)

\*Weight is used to take the place of the (four) sub-bottom transducers.

## Tow Vehicle - Sub-Bottom Profiling (SBP)

### C3D Tow Vehicle (Featuring Side Scan Sonar, Bathymetry & Sub-Bottom Profiling)

The TTV-290 series of tow vehicles is designed for hydrodynamic stability in most side scan towing applications. The side scan transducer bays are designed to offer 20, 30, and 40 degrees downward looking positions for optimum performance in a variety of different applications. The stainless steel midplate construction gives users a rigid and stable platform to mount additional sensors. The high visibility yellow polyethylene covers are designed to handle years of use. These new and improved shells are more resistant to impact than earlier models, and are easy and cost effective to modify or replace.

### SUBSEA UNITS

#### TTV-298

##### C3D-SBP Tow Vehicle **ADSL**

TTV-298 tow vehicle (ADSL) operates at 200 kHz and is designed for operations up to 2000 meter depth with cable length up to 5000 meters at 5Mbits throughput. In addition, this vehicle offers a 2x2 sub-bottom profiler transmitter array operating at 2-7 kHz and a dual hydrophone for optimal performance. The standard vehicle is equipped with a motion reference unit and a Teledyne RDI Depth/CTD sensor. The TTV-298 offers (2) additional RS-232 communication ports with 12 and/or 24 VDC.

#### TTV-299

##### C3D-SBP Tow Vehicle **VDSL**

TTV-299 Tow Vehicle (VDSL) operates at 200 kHz and is designed for operations up to 1000 meter depth with cable length up to 1000 meters at 7.5Mbits throughput. In addition, this vehicle offers a 2x2 sub-bottom profiler transmitter array operating at 2-7 kHz and a dual hydrophone for optimal performance. The standard vehicle is equipped with a motion reference unit and a Teledyne RDI Depth/CTD sensor. The TTV-299 offers (2) additional RS-232 communication ports with 12 and/or 24 VDC.



#### C3D with Sub-Bottom Profile

(Featuring Side Scan Sonar, Bathymetry & Sub Bottom Profiling)



Transducers mounted inside of unit

## C3D-TOW Vehicles

# Surface Units

### VDSL Transceiver

#### Part Number

#### Description

**CL-162** ..... Includes a 270 volt power supply for the Tow vehicle, a high speed communications link (VDSL) for cable operations up to 1000 meters (single co-axial), and an Ethernet hub for interfacing between the Tow vehicle and the topside data acquisition computer (DAC).



**VDSL Transceiver**  
(Part Number: CL-162)

### ADSL Transceiver

**CL-163** ..... Includes a 270 volt power supply for the Tow vehicle, communications link (ADSL) for long cable operations up to 5000 meters using a single co-axial cable. This unit interfaces the topside data acquisition computer (DAC) with the Tow vehicle.



**ADSL Transceiver**  
(Part Number: CL-163)



## C3D-TOW Vehicles

# Surface Units

### Digital Acquisition Computer (DAC)

This industrial rackmount computer comes in a rugged case that is designed for optimum acquisition performance and durability. It is equipped with a high end Intel processor. The hard drive offers ample room for data storage and is minimally 500GB in size. This computer also offers a gigabyte Ethernet connection and comes with a high-resolution 20" flat screen monitor, a full function keyboard and a mouse.



**Digital Acquisition Computer with Monitor**

See page 37 for software package descriptions.

| Part Number | Description   |
|-------------|---|
| DAC-310     | C3D Rackmount Computer for Side Scan Bathymetry with <b>Triton® Isis Bathy</b>  |
| DAC-350     | C3D Rackmount Computer for Side Scan Bathymetry with <b>Hypack® Survey</b>      |
| DAC-610     | C3D Rackmount Computer for Sub-bottom Profiling with <b>Triton® SB-Logger</b>   |
| DAC-650     | C3D Rackmount Computer for Sub-bottom Profiling with <b>Hypack® Survey +SBP</b> |

### Options

**Integration** > laptop options available to integrate into customer system

**Integration** > with other data acquisition software available - QPS, OIC, EIVA

## C3D-TOW

# Miscellaneous

### Kevlar Cables (Deck Only Cable - Not for Towing)

The C3D-TOW system is delivered with a standard 100m Deck Cable of 0.35" diameter, single coax, reinforced with an abrasion resistant urethane jacket. The cable includes the dry side RF style connector to the CL-162 or CL-163 transceiver and a Kevlar cable termination assembly for the wet side consisting of a Kellems grip and a molded female 4-pin micro connector (MCIL-4F) with a locking sleeve.

#### Part Number

#### Description

**014330-100**..... Kevlar Deck Only coax cable w/termination 100 m  
**ES LENGTH** ..... Additional meter of Kevlar Deck Only cable - per meter

**Example:** A 125 meter cable would be priced as a 100 meter cable with 25 meters of extra cable @ \$10/meter

### Armored Cables (Tow Cable)

**013295** ..... Armored tow coax cable 0.45" dia. w/termination TWC-290 - 200 m  
**ES LENGTH** ..... Additional meter of armored coax cable 0.45" dia. - per meter

\*Not to exceed 5000 meters based on 5 Mbits/sec data rate  
 \*\*Recommend Rochester A301241 for application over 5000 meters

**C-250-218** ..... TWC-290 armored cable termination (0.45") diameter assembly for TTV-290 series

### Shipping Cases

**012692** ..... Wood crate for TTV-290 series, cable, transceiver and DAC(s)  
**012207** ..... Rugged plastic shipping case for DAC computer, monitor, keyboard and manual

### Options for C3D-TOW Series

**B298-0528**..... Y-molded cable for multiple ancillary sensors (3 or 4 sensors)  
**D298-0444** ..... (Bottle) Over-the-side mounting bracket  
**D664-0110** ..... Towfish pole mounted bracket



(Bottle) Over the side mount, D298-0444



Towfish pole mounted bracket, D664-0110



## C3D-TOW Configuration Integrated Packages

### C3D PACKAGES with Triton® Isis Bathy Software

| Part Number      | Description  |
|------------------|--|
| <b>C3D-TOW-1</b> | <b>C3D Tow Vehicle Package Includes:</b>                             |
| TTV-296          | C3D tow vehicle - <b>ADSL</b>  |
| CL-163           | ADSL transceiver   |
| DAC-310          | Rackmount computer for side scan bathymetry with Triton® Isis Bathy* |
| 014330-100       | Kevlar deck only coax cable - 100 m                                  |
| 012692           | Wood crate for TTV-290 series tow vehicle + cable + transceiver      |
| 012207           | Rugged plastic shipping case for DAC, monitor, keyboard and manual   |
| <b>C3D-TOW-3</b> | <b>C3D Tow Vehicle Package Includes:</b>                             |
| TTV-297          | C3D tow vehicle - <b>VDSL</b>  |
| CL-162           | VDSL transceiver   |
| DAC-310          | Rackmount computer for side scan bathymetry with Triton® Isis Bathy* |
| 014330-100       | Kevlar deck only coax cable - 100 m                                  |
| 012692           | Wood crate for TTV-290 series tow vehicle + cable + transceiver      |
| 012207           | Rugged plastic shipping case for DAC, monitor, keyboard and manual   |

### C3D PACKAGES with Hypack® Survey Software

|                  |  |
|------------------|--|
| <b>C3D-TOW-2</b> | <b>C3D Tow Vehicle Package Includes:</b>                           |
| TTV-296          | C3D tow vehicle - <b>ADSL</b>                                      |
| CL-163           | ADSL transceiver   |
| DAC-350          | Rackmount computer for side scan bathymetry with Hypack® Survey*   |
| 014330-100       | Kevlar deck only coax cable - 100 m                                |
| 012692           | Wood crate for TTV-290 series tow vehicle + cable + transceiver    |
| 012207           | Rugged plastic shipping case for DAC, monitor, keyboard and manual |
| <b>C3D-TOW-4</b> | <b>C3D Tow Vehicle Package Includes:</b>                           |
| TTV-297          | C3D tow vehicle - <b>VDSL</b>                                      |
| CL-162           | VDSL transceiver   |
| DAC-350          | Rackmount computer for side scan bathymetry with Hypack® Survey*   |
| 014330-100       | Kevlar deck only coax cable - 100 m                                |
| 012692           | Wood crate for TTV-290 series tow vehicle + cable + transceiver    |
| 012207           | Rugged plastic shipping case for DAC, monitor, keyboard and manual |

\*Laptop package upgrades are available, please call for additional information.



## C3D-SBP Configuration

# Integrated Packages

### With Sub-Bottom Profiling

#### C3D PACKAGES with Triton® Isis and Triton® SB Logger Software

| Part Number          | Description   |
|----------------------|---|
| <b>C3D-SBP-TOW-1</b> | <b>C3D-SBP Tow Vehicle Package Includes</b>                         |
| TTV-298              | C3D tow vehicle - <b>ADSL</b>                                       |
| CL-163               | ADSL transceiver  |
| DAC-310              | Rackmount computer for side scan bathymetry with Triton® Isis Bathy |
| DAC-610              | Rackmount computer for sub-bottom with Triton® SB Logger            |
| 014330-100           | Kevlar Deck Only coax cable - 100 m                                 |
| 012692               | Wood crate for TTV-290 series tow vehicle + cable + transceiver     |
| 012207               | Rugged plastic shipping case for DAC, monitor, keyboard and manual  |

|                      |   |
|----------------------|---|
| <b>C3D-SBP-TOW-3</b> | <b>C3D-SBP Tow Vehicle Package Includes</b>                         |
| TTV-299              | C3D tow vehicle - <b>VDSL</b>                                       |
| CL-162               | VDSL transceiver  |
| DAC-310              | Rackmount computer for side scan bathymetry with Triton® Isis Bathy |
| DAC-610              | Rackmount computer for sub-bottom with Triton® SB Logger            |
| 014330-100           | Kevlar Deck Only coax cable - 100 m                                 |
| 012692               | Wood crate for TTV-290 series tow vehicle + cable + transceiver     |
| 012207               | Rugged plastic shipping case for DAC, monitor, keyboard and manual  |

#### C3D PACKAGES with Hypack® Survey Software

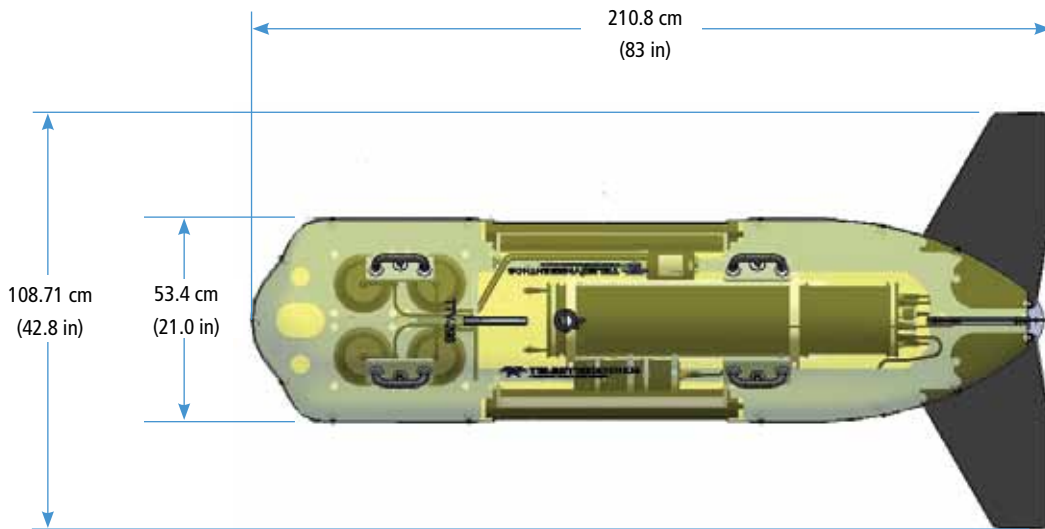
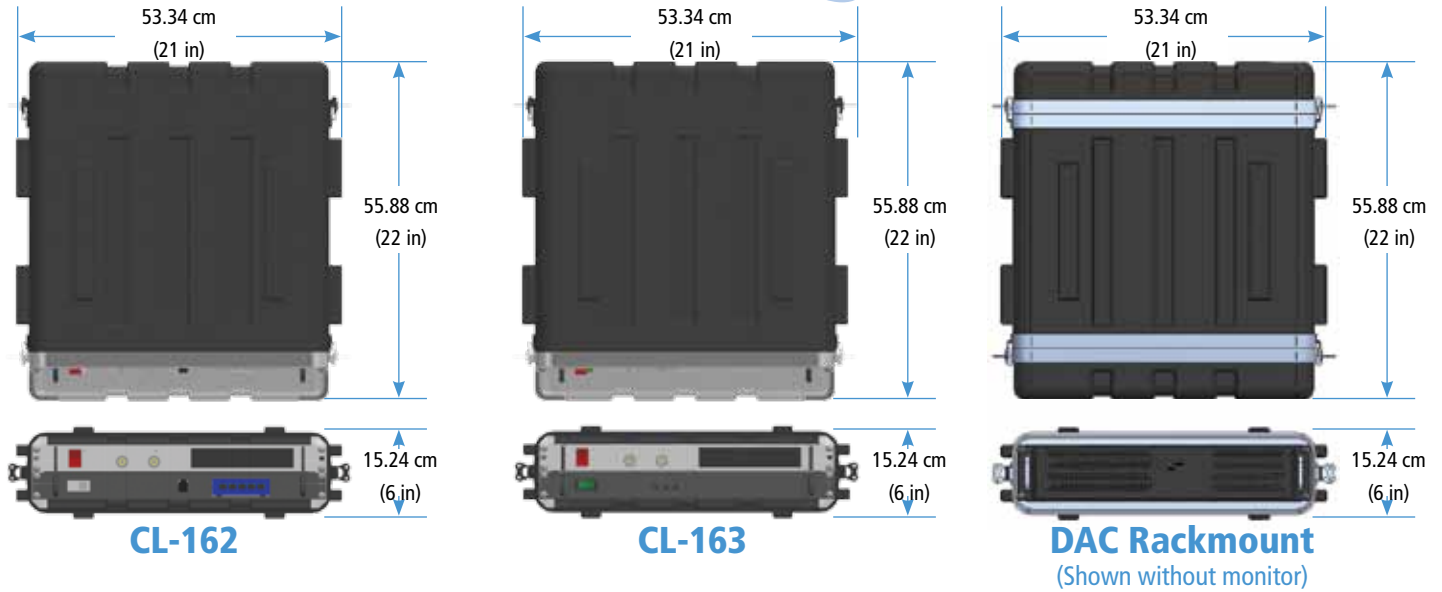
|                      |  |
|----------------------|--|
| <b>C3D-SBP-TOW-2</b> | <b>C3D-SBP Tow Vehicle Package Includes</b>                        |
| TTV-298              | C3D-SBP tow vehicle - <b>ADSL</b>                                  |
| CL-163               | ADSL transceiver   |
| DAC-350              | Rackmount computer for side scan bathymetry with Hypack® Survey    |
| 014330-100           | Kevlar Deck Only coax cable - 100 m                                |
| 012692               | Wood crate for TTV-290 series tow vehicle + cable + transceiver    |
| 012207               | Rugged plastic shipping case for DAC, monitor, keyboard and manual |

|                      |  |
|----------------------|--|
| <b>C3D-SBP-TOW-4</b> | <b>C3D-SBP Tow Vehicle Package Includes</b>                        |
| TTV-299              | C3D tow vehicle - <b>VDSL</b>                                      |
| CL-162               | VDSL transceiver   |
| DAC-350              | Rackmount computer for side scan bathymetry with Hypack® Survey    |
| 014330-100           | Kevlar Deck Only coax cable - 100 m                                |
| 012692               | Wood crate for TTV-290 series tow vehicle + cable + transceiver    |
| 012207               | Rugged plastic shipping case for DAC, monitor, keyboard and manual |

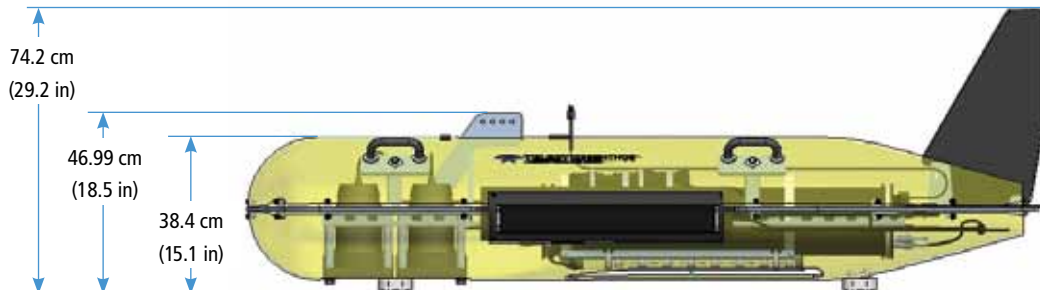
\*See pages 37 for software package descriptions.

# C3D-Tow, C3D-SBP

## Dimensional Drawings



**C3D-SBP  
Tow Vehicle**



**C3D-SBP  
Cross-Section**



## C3D-TOW

# Specifications

### SIDE SCAN SONAR & BATHYMETRY COMPONENTS

|  |   |
|--|---|
| Sonar Frequency:                       | 200 kHz   |
| Maximum Operating Depth:               | 2000 m  |
| Side Scan Range:                       | 25 to 300 m per side  |
| Bathymetric Range:                     | 6-10 times altitude   |
| Resolution (across track)*             |   |
| Side Scan Sonar:                       | ~4.5 cm/20 cm (ADSL)  |
| Bathymetry:                            | ~5.5 cm/20 cm (ADSL)  |
| Beam Width                             | 1 degree (one-way)  |
| Pulse Length:                          | 0.125 - 3 msec to 1 msec<br>(depending on range)  |
| Repetition Rate:                       | Up to 30 pings/sec  |
| Depression Angle:                      | Adjustable 20, 30, 40 degrees   |
| Transmit Source Level:                 | Maximum 224dB re: 1µPa@1m   |
| Vertical Resolution:<br>(Bathymetry)   | ≤ 5 cm  |
| Standard Sensors:                      | CTD Heading, Pitch, Roll  |
| Standard Sensors:<br>(sold separately) | Altimeter (optional)<br>Magnetometer (optional)<br>High accuracy motion reference unit<br>with (optional) heave |

### TOW VEHICLE

|                      |  |
|----------------------|--|
| Construction:        | Stainless steel, polyethylene          |
| Length:              | 210.8 cm (83 in)                       |
| Front Cross Section: | 38.4 cm x 53.4 cm<br>(15.1 in x 21 in) |
| Weight in air:       | 122 kg (270 lbs)                       |
| Weight in water:     | 75 kg (165 lbs)                        |

### TOPSIDE DATA ACQUISITION (DAC)

|                    |  |
|--------------------|--|
| Operating System:  | Windows XP   |
| Storage:           | Large capacity hard drive, writable CD/DVD   |
| Network Interface: | 2x100 base T Ethernet<br>(compatible with ADSL high speed communication interface) |
| Serial:            | 4x RS-232, 6xUSB, 1X parallel  |
| Display Monitor:   | 20" flat panel   |

### TOPSIDE TRANSCIVER

|                    |   |
|--------------------|---|
| Power Supply:      | Input 120/240 VAC auto-sensing, output 300VDC maximum |
| Network interface: | Ethernet  |
| Dimensions:        | 2U Rack mount 48.3 cm<br>(19 inches)                  |

### SOFTWARE

|                               |   |
|-------------------------------|---|
| C3D controller (proprietary): | Standard, K8E format  |
| Acquisition:                  | Triton®, Isis (standard)/Hypack/<br>OIC/QINSy<br>(side scan/bathymetry) |
| Post-Processing (optional):   | Many third party available  |
| Data Format:                  | XTF, HSX, OIC, QINSy  |

**\*NOTE:** Resolution stated is dependent on data communication method. Some communication methods require the data to be decimated to match available band width.



## C3D-SBP

# Specifications

### SIDE SCAN SONAR & BATHYMETRY COMPONENTS

|                            |   |
|----------------------------|---|
| Sonar Frequency:           | 200 kHz   |
| Maximum Operating Depth:   | 2000 m  |
| Side Scan Range:           | 25 to 300 m per side  |
| Bathymetric Range:         | 6-10 times altitude   |
| Resolution (across track)* |   |
| Side Scan Sonar:           | ~4.5 cm/18 cm (ADSL)  |
| Bathymetry:                | ~5.5 cm   |
| Beam Width                 | 1 degree (one-way)  |
| Pulse Length:              | 0.125 - 3 msec<br>(depending on range)  |
| Repetition Rate:           | Up to 30 pings/sec  |
| Depression Angle:          | Adjustable 20, 30, 40 degrees   |
| Transmit Source Level:     | Maximum 224dB re: 1 μPa@1M  |
| Auxiliary Sensors:         | Pressure/Depth/CTD RDI Citadel<br>Heading (standard)<br>Pitch (standard)<br>Roll (standard)<br><br>Altimeter (optional)<br>Magnetometer (optional)<br>Optical Gyro (optional)<br>High Accuracy Motion Reference<br>Unit with Heave (optional) |

### CHIRP SUB - BOTTOM COMPONENTS

|                          |  |
|--------------------------|--|
| Chirp Frequency:         | 2 to 7 kHz   |
| Maximum Operating Depth: | 2000 meters  |
| Range Selection:         | 63 ms to 8 sec   |
| Pulse Length:            | 5 msec. to 50 msec.<br>Pulse waveform stored in memory |
| Repetition Rate:         | Up to 15 pings/sec                                     |
| Output Power:            | 1.6 kW, 15% duty cycle at 3.5 kHz                      |

**\*NOTE:** Resolution stated is dependent on data communication method. Some communication methods require the data to be decimated to match available band width.

### TOW VEHICLE

|                      |  |
|----------------------|--|
| Construction:        | Stainless steel, polyethylene            |
| Length:              | 210.8 cm (83 inches)                     |
| Front Cross Section: | 38.4 cm x 53.4 cm<br>(15.1 in. x 21 in.) |
| Weight in air:       | 168 kg (370 lbs)                         |
| Weight in water:     | 100 kg (220 lbs)                         |
| Electrical Power:    | 135 Watts at 300 VDC                     |

### TOPSIDE DATA ACQUISITION (DAC)

|                    |  |
|--------------------|--|
| Operating System:  | Windows XP   |
| Storage:           | Large capacity hard drive,<br>writable CD/DVD  |
| Network Interface: | 2 x 100base T Ethernet<br>(compatible with ADSL high-speed communications interface) |
| Serial:            | 4 x RS-232, 6 x USB, 1 x Parallel  |
| Display Monitor:   | 20" flat panel   |

### TOPSIDE TRANSCIEVER UNIT

|                    |   |
|--------------------|---|
| Power Supply:      | Input 120/240 VAC auto sensing,<br>output 300 VDC maximum |
| Network Interface: | Ethernet  |
| Dimensions         | 2U Rack Mount 48.3 cm<br>(19 inches)                      |

### SOFTWARE

|                               |  |
|-------------------------------|--|
| C3D controller (proprietary): | Standard   |
| Acquisition:                  | Triton® Isis<br>(standard)<br><br>• Side scan/<br>bathymetry<br><br>• Triton®<br>SB-Logger<br>(standard)<br><br>• Sub-bottom |
| Post-Processing (optional):   | Many third party available   |
| Data Format:                  | XTF, SEG-Y   |

**NOTE:** Systems using Triton Acquisition software will use two DACs, systems using Hypack Acquisition software will use one DAC.



## C3D-LPM Lightweight Pole Mount

### C3D-LPM

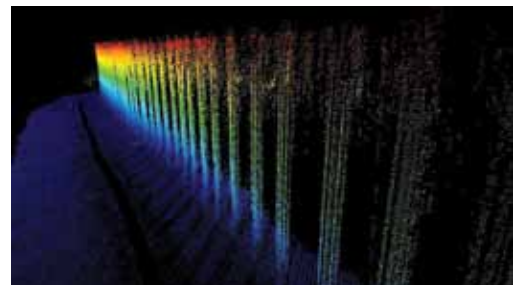
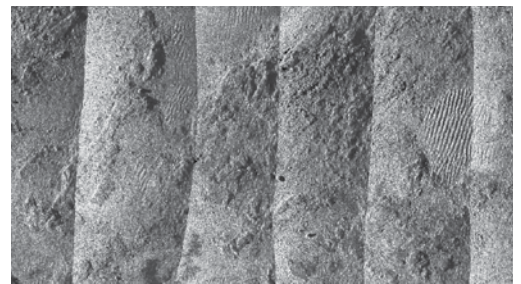
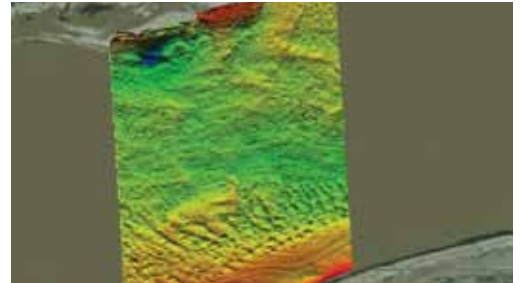


#### C3D-LPM Configuration

##### Side Scan - Bathymetry

The C3D-LPM system combines high-resolution imagery and wide swath bathymetry for bottom mapping, image interpretation, and 3-dimensional modeling of the seafloor. This easy to maneuver, ultra-portable package represents the latest in sonar imaging. Using patented Computed Angle of Arrival Transient Imaging (CAATI)\* technology and a multi-array transducer, capable of solving for multiple angles-of-arrival, the C3D-LPM consistently produces highly detailed views of the seafloor every time.

\* Under license from Simon Fraser University



#### Applications

- Coastal studies
- Fisheries
- Engineering and scientific studies
- Sea bed classification
- Small vessel
- Shallow water

# C3D-LPM

## C3D-LPM Lightweight Pole Mount (Featuring Side Scan & Bathymetry)

The C3D system provides efficiencies for surveyors by offering a wider swath than conventional bathymetry systems and the combination of both imagery and bathymetry in one sensor. The C3D-LPM system is designed for fisheries habitat mapping, port and harbor clearance, coastal studies and mine countermeasures and any other shallow surveys (0.1 to 100 meter max. altitude for optimal performance). Its manageable small size is ideal for small craft operations.

### SUBSEA UNITS

#### D298-0470

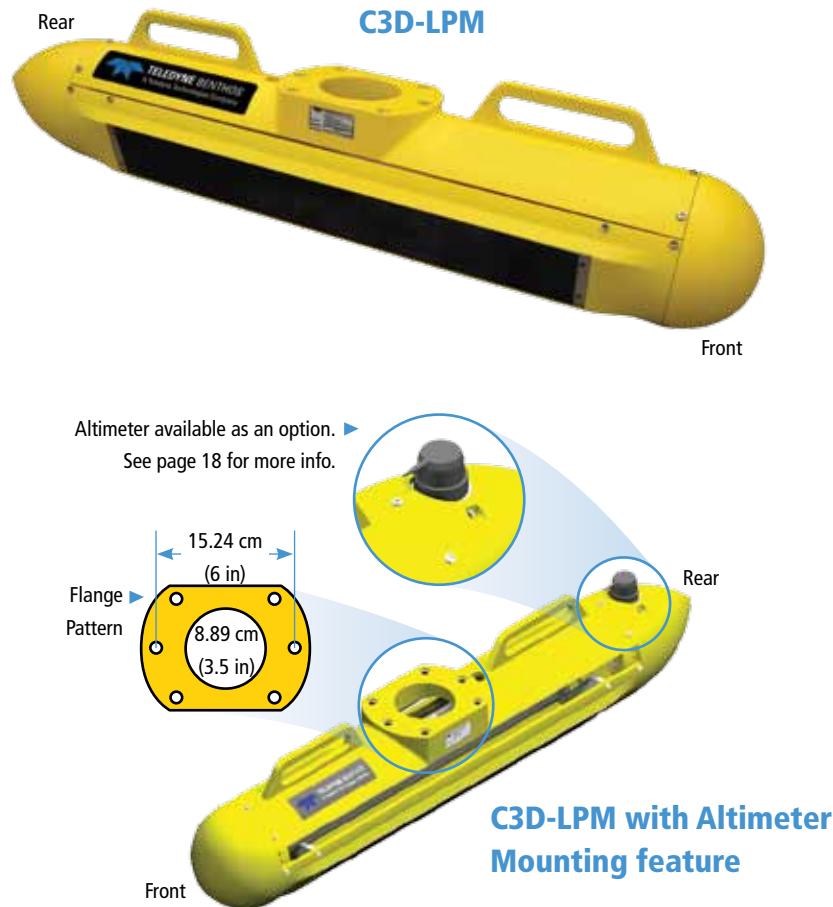
##### C3D-LPM Lightweight Pole Mount Subsea Pod - Standard

This subsea pod is polyurethane with an imbedded type 316 stainless steel substructure in the pole mounting section, nose and tail. The standard 200 kHz C3D transducers can be set at 20, 30, or 40 degrees declination. It mounts on a 6 inch bolt circle with six 1/2-13 threaded holes.

#### D298-0495

##### C3D-LPM Lightweight Pole Mount Subsea Pod with Altimeter Mounting

This subsea pod has the identical features as the standard subsea pod listed above. The additional feature is a holder cut into the tail for mounting an optional altimeter (altimeter not included).





## C3D-LPM

# Surface Units

### C3D-LPM Transceiver

#### Part Number

#### Description

**D298-0650** ..... The C3D-LPM transceiver offers the same processing capabilities as the standard C3D systems in a small package. There are specific input ports for MRU, sound velocity and altimeter. It provides power, command, and trigger output for altimeter, and has a BNC port with 5V trigger output for synchronizing acoustic devices, such as the Chirp III. The LPM transceiver is powered by 110/220V input.



**C3D-LPM Transceiver**  
(Part Number: D298-0650)

### Digital Acquisition Computer

This industrial rackmount computer comes in a rugged case that is designed for optimum data acquisition performance and versatility. It comes with a high-end Intel processor. The hard drive offers ample room for data storage (minimally 500GB in size). This computer also offers dual gigabyte Ethernet connections, dual DVI output, 4 DB9 serial and 6 USB ports. In addition, DACs come with a high-resolution 20 inch flat screen monitor, a full function keyboard and a mouse.

#### Part Number

#### Description

**DAC-310** ..... C3D rackmount computer for side scan bathymetry with **Triton® Isis Bathy**

**DAC-350** ..... C3D rackmount computer for side scan bathymetry with **Hypack® Survey**

See pages 37 for software package descriptions.



**Digital Acquisition Computer with Monitor**

## Options

**Laptop** > options available

**Software** > integration with other data acquisition software available - QPS, OIC, EIVA

# C3D-LPM

## Miscellaneous

### Cables

| Part Number  | Description  |
|--------------|--|
| B298-0485-10 | C3D-LPM transducer cables - requires 2 (1 for port & 1 for starboard) but sold separately - 10m each |
| B298-0485-20 | C3D-LPM transducer cables - requires 2 (1 for port & 1 for starboard) but sold separately - 20m each |

### C3D-LPM Transducer Cables (2 required)



### Shipping Cases

|        |  |
|--------|--|
| 012911 | Hardigg C3D-LPM case for subsea pod + cables + transceiver                     |
| 012207 | Rugged plastic shipping case for DAC (computer, monitor, keyboard, and manual) |
| 014420 | Rugged C3D-LPM case for (2) deck cables and subsea pod                         |
| 014421 | Rugged C3D-LPM case for transceiver and computer                               |



**C3D-LPM Case for Transceiver and Computer**  
(Part Number: 014421)



**C3D-LPM Case for Deck Cables and Vehicle**  
(Part Number: 014420)



## C3D-LPM

### Options for C3D-LPM Series

|                 |   |
|-----------------|---|
| 012976 .....    | Altimeter (500 kHz) - 50m range           |
| 013683-10 ..... | Sound velocity and depth sensor kit (10m) |
| 013683-20 ..... | Sound velocity and depth sensor kit (20m) |
| 013112 .....    | Sonardyne radian motion reference sensor  |

### Motion Reference Unit Options

Teledyne TSS motion sensors are designed to enable highly productive hydrographic surveying in all sea conditions, TSS motion sensors are proven to negate the errors associated with motion and exceed the requirements of IHO standards.

### DMS Series: DMS-25, DMS-10, DMS-05

- Dynamic roll and pitch accuracy to 0.05°
- Depth rated to 3000m with optional 6000m
- Real-time digital and analogue outputs

|              |                               |
|--------------|-------------------------------|
| DMS-25 ..... | 0.25 degrees angular accuracy |
| DMS-10 ..... | 0.10 degrees angular accuracy |
| DMS-05 ..... | 0.05 degrees angular accuracy |



DMS-25

### ORION: Inertial Navigation System (INS)

- Collects high accuracy surface or subsea attitude, heading and heave data critical to hydrographic surveys and subsea vehicle operations.

|                     |                               |
|---------------------|-------------------------------|
| Orion Surface ..... | 0.01 degrees angular accuracy |
| Orion Subsea .....  | 0.01 degrees angular accuracy |



ORION



# C3D-LPM Configuration Integrated Packages

## C3D-LPM PACKAGES with Triton® Isis Bathymetric Software

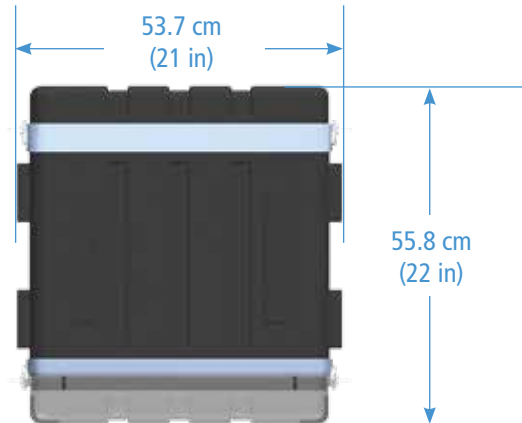
| Part Number          | Description  |
|----------------------|--|
| <b>C3D-LPM-1-20</b>  | <b>C3D-LPM Package with Triton® Isis Bathy Software</b>                                      |
| D298-0470            | C3D-LPM lightweight pole mount subsea assembly   |
| D298-0650            | C3D-LPM transceiver  |
| DAC-310              | C3D rackmount computer for SSB with Triton® Isis Bathy                                       |
| B298-0485-20         | C3D-LPM transducer cables - requires 2 (included) - 20 m                                     |
| 014420               | Rugged plastic C3D-LPM case for LPM tow pod and cables                                       |
| 014421               | Rugged plastic shipping case for DAC, monitor, keyboard and transceiver                      |
| <b>C3D-LPM-12-20</b> | <b>C3D-LPM Package with Triton® Isis Bathy Software &amp; Altimeter Mounting</b>             |
| D298-0495            | C3D-LPM lightweight pole mount subsea assembly with altimeter mount (altimeter not included) |
| D298-0650            | C3D-LPM transceiver  |
| DAC-310              | C3D rackmount computer for SSB with Triton® Isis Bathy                                       |
| B298-0485-20         | C3D-LPM transducer cables - requires 2 (included) - 20 m                                     |
| 014420               | Rugged plastic C3D-LPM case for LPM tow pod and cables                                       |
| 014421               | Rugged plastic shipping case for DAC, monitor, keyboard and transceiver                      |

## C3D-LPM PACKAGES with Hypack® Survey Software

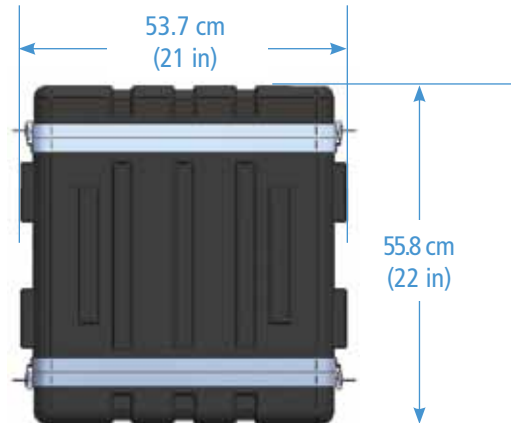
|                      |  |
|----------------------|--|
| <b>C3D-LPM-2-20</b>  | <b>C3D-LPM Package Vehicle with Hypack® Survey Software</b>                                  |
| D298-0470            | C3D-LPM lightweight pole mount subsea assembly   |
| D298-0650            | C3D-LPM transceiver  |
| DAC-350              | C3D rackmount computer with Hypack® Survey Software  |
| B298-0485-20         | C3D-LPM transducer cables - requires 2 (included) - 20 m each                                |
| 014420               | Rugged plastic C3D-LPM case for LPM tow pod and cables                                       |
| 014421               | Rugged plastic shipping case for DAC, monitor, keyboard and transceiver                      |
| <b>C3D-LPM-22-20</b> | <b>C3D-LPM Package with Hypack® Survey Software &amp; Altimeter Mounting</b>                 |
| D298-0495            | C3D-LPM lightweight pole mount subsea assembly with altimeter mount (altimeter not included) |
| D298-0650            | C3D-LPM transceiver  |
| DAC-350              | C3D rackmount computer with Hypack® survey software  |
| B298-0485-20         | C3D-LPM transducer cables - requires 2 (included) - 20 m                                     |
| 014420               | Rugged plastic C3D-LPM case for LPM tow pod and cables                                       |
| 014421               | Rugged plastic shipping case for DAC, monitor, keyboard and transceiver                      |

## C3D-LPM

# Dimensional Drawings

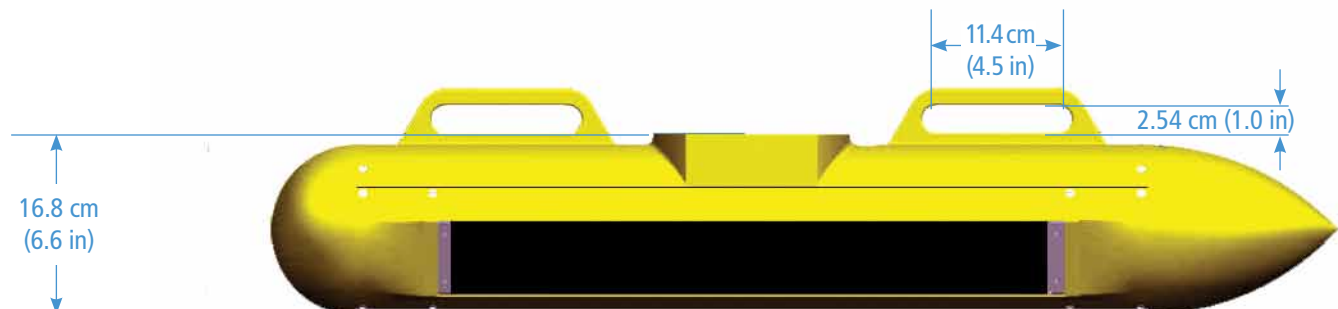
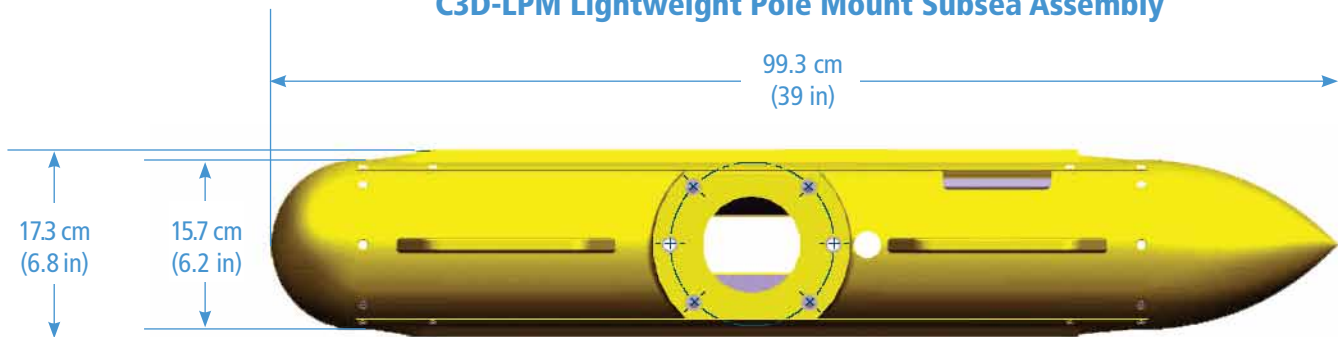


**C3D-LPM Transceiver**



**DAC Rackmount**  
(Shown without monitor)

### C3D-LPM Lightweight Pole Mount Subsea Assembly





## C3D-LPM

# Specifications

### SYSTEM

|  |  |
|--|--|
| Sonar Frequency:                       | 200 kHz  |
| Optimum Surveying Depth:               | 0 to 100 m   |
| Side Scan Range:                       | 25 to 300 m per side   |
| Bathymetric Range:                     | 6-10 times altitude  |
| Resolution (across track)              |  |
| Side Scan Sonar:                       | ~4.5 cm  |
| Bathymetry:                            | ~5.5 cm  |
| Beam Width                             | 1 degree (one-way)   |
| Pulse Length:                          | 0.125 - 3 msec<br>(depending on range)   |
| Repetition Rate:                       | Up to 30 pings/sec   |
| Depression Angle:                      | 40 degrees (default) 30° and 20° available   |
| Transmit Source Level:                 | Maximum 224dB re: 1µPa@1m  |
| Vertical Resolution:<br>(Bathymetry)   | 5 cm   |
| Optional Sensors:<br>(sold separately) | Depth/CTD/RDI Citadel (optional)<br>Heading / Pitch / Roll<br>Altimeter (optional)<br>Motion reference unit (optional) |

### OVER-THE-SIDE-MOUNT

|                |                                   |
|----------------|-----------------------------------|
| Construction:  | Stainless steel with polyethylene |
| Length:        | 99.3 cm (39 in)                   |
| Diameter:      | 17.3 cm (6.8 in)                  |
| Weight in air: | 20.4 kg (45 lbs)                  |

### TOPSIDE DATA ACQUISITION COMPUTER (DAC)

|                    |  |
|--------------------|--|
| Operating System:  | Windows XP   |
| Storage:           | Large capacity hard drive, writable CD/DVD   |
| Network Interface: | 2x100 base T Ethernet<br>(compatible with ADSL high speed communication interface) |
| Serial:            | RS-232 x 4   |
| Display Monitor:   | 20" Flat Panel   |

### TOPSIDE TRANSCIEVER

|                    |  |
|--------------------|--|
| Power Supply:      | Input 120/220 VAC auto-sensing, output 48VDC |
| Network interface: | Ethernet                                     |
| Dimensions:        | 2U Rack mount 48.3 cm (19 inches)            |

### SOFTWARE

|                               |  |
|-------------------------------|--|
| C3D Controller (proprietary): | Standard                               |
| Acquisition:                  | Triton®, Hypack, QPS, OIC, EIVA        |
| Post-Processing (optional):   | Triton®, Hypack, QPS, OIC, EIVA, CARIS |
| Data Format:                  | XTF                                    |

### CABLES (Call for specific cable requirements)

|                    |                        |
|--------------------|------------------------|
| Kevlar Deck Cable: | 10 m each (requires 2) |
| Kevlar Tow Cable:  | 20 m each (requires 2) |

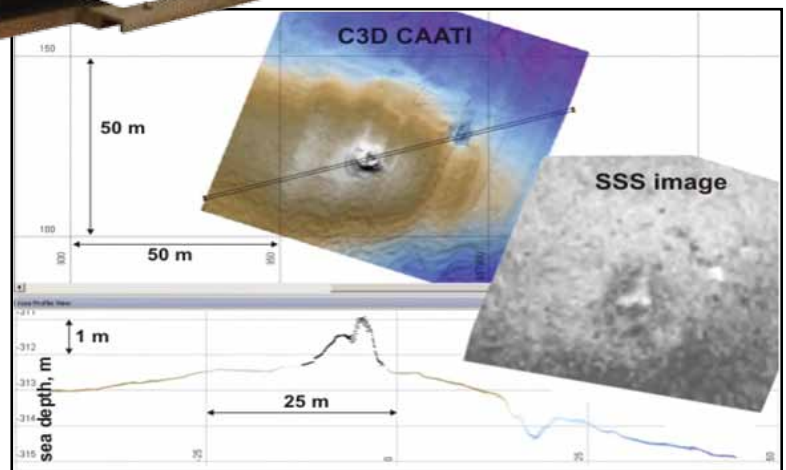
## Deep Water Side Scan & Bathymetry

# C3D-Deep Tow



A rugged 3000 m or 6000 m rated version of the C3D. This deep water vehicle offers colocated high-resolution side scan imagery with bathymetric data and produces 3D images. It is positively buoyant with emergency acoustic release capabilities. It also accommodates many sensors and optional equipment.

This C3D-Deep Tow can also be supplied with optional sub-bottom profiling capabilities.

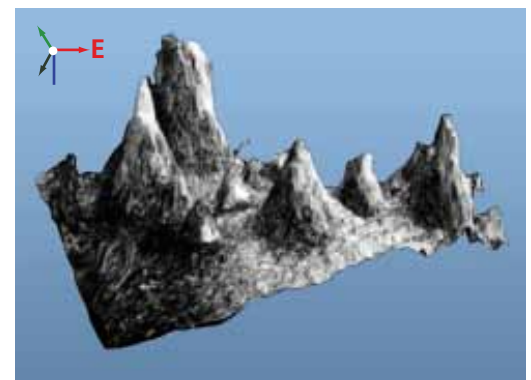


C3D-SSP sample courtesy of PeterGaz, Russia

Modern Technologies of the Geophysical Investigations on the Shelf for the Purposes of Geohazards Detection. A. Fyodorov, S. Mironyuk, S. Kleshchin (Peter Gaz Ltd., Russia)

### Applications

- Deep water survey applications
- Deep sea floor habitat mapping
- Oil and gas route survey
- Pipeline hazard inspection
- Search and locate
- Deep water mining applications



1700m depth, 40m tall

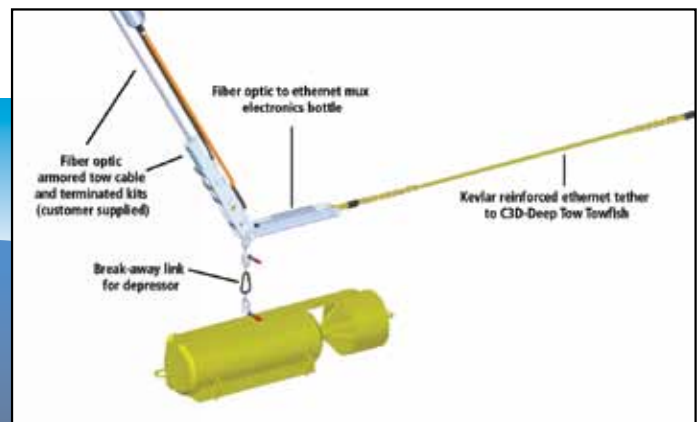
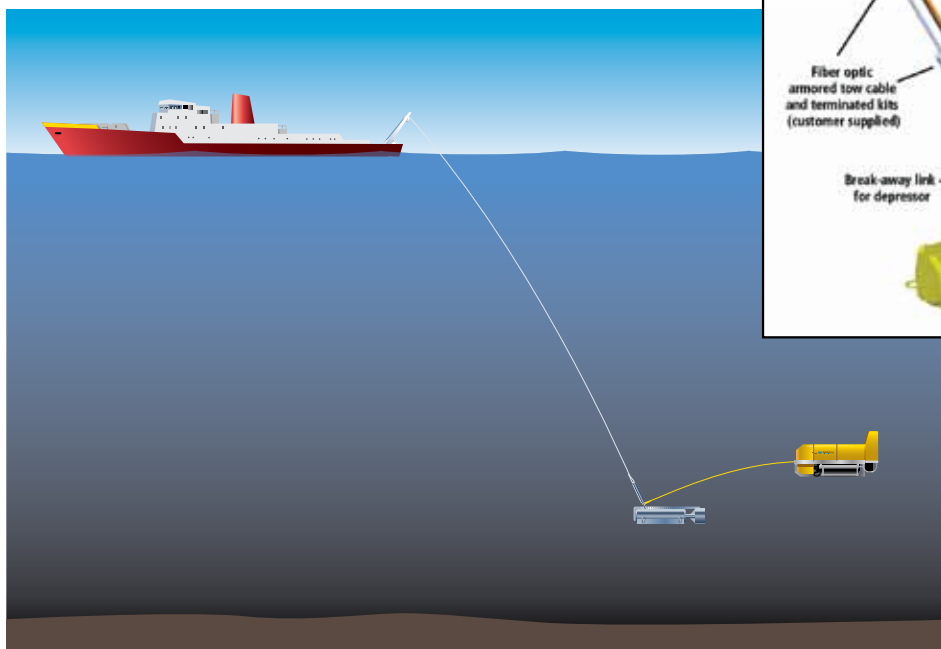
Courtesy of JOGMEC (DORR)



## C3D-Deep Tow

# System Features

- C3D-Deep Tow vehicle is offered with 3000 m or 6000 m depth rated vehicles.
- 100 kHz operating frequency
- Rugged, durable vehicle designed to handle towing speeds up to 10 knots. However, the normal survey speeds are between 1-5 knots.
- C3D-Deep Tow topside unit (CL-164) has a built-in Ethernet interface that allows it to easily interface with the Teledyne Benthos Digital Acquisition Computer (DAC) running Triton® Isis software.
- Isis software will record all the data from the various sensors including side scan, altitude, pressure, and bathymetry data into a geo-referenced file. All these data are recorded simultaneously in real-time.
- The CL-164 topside's Ethernet connection makes it easy for it to be interfaced with many other 3rd party processors. These processors must include software that is capable of displaying and processing the C3D data.
- C3D-Deep Tow has the built-in ability to interface with numerous motion reference units, magnetometers and USBL transponders. The C3D Deep Tow system's communication link is able to multiplex up to 4 RS-232 sensors and a transponder.



Depressor (at 2000 lbs) is designed to work with many cable lengths.



## C3D-Deep Tow

# Specifications

### SIDE SCAN SONAR & BATHYMETRY COMPONENTS

|                            |  |
|----------------------------|--|
| Sonar Frequency:           | 100 kHz                                |
| Maximum Operating Depth:   | 3000 m or 6000 m                       |
| Side Scan Range:           | 25 to 500 m per side (100 kHz)         |
| Bathymetric Range:         | 6-10 times altitude                    |
| Resolution (across track)* | 100 kHz                                |
| Side Scan Sonar:           | ~4.5 cm                                |
| Bathymetry:                | ~5.5 cm                                |
| Beam Width:                | 1.2 degree (one-way)                   |
| Pulse Length:              | 25 µsec to 3 msec (depending on range) |
| Repetition Rate:           | Up to 30 pings/sec                     |
| Depression Angle:          | 20, 30 or 40 degrees (default)         |
| Transmit Source Level:     | Maximum 224dB re: 1µPa@1m              |

### CHIRP SUB-BOTTOM COMPONENTS

|                          |  |
|--------------------------|--|
| Chirp Frequency:         | 2 to 7 kHz   |
| Maximum Operating Depth: | 3000 m or 6000 m                                     |
| Range Selection:         | 63 msec to 8 sec                                     |
| Pulse Length:            | 5 msec to 50 msec<br>Pulse waveform stored in memory |
| Repetition Rate:         | Up to 15 pings/sec                                   |
| Output Power:            | 1.6 kW, 15% duty cycle at 3.5 kHz                    |

### TOW VEHICLE, TTV-193 MODEL

|                   |  |
|-------------------|--|
| Construction:     | Aluminum frame with attached syntactic foam for buoyancy                       |
| Dimensions:       | Length - 239 cm (94 in.)<br>Width - 84 cm (33 in.)<br>Height - 114 cm (45 in.) |
| Weight in air:    | 590 kg (1300 lbs approx.)  |
| Weight in water:  | 91 kg (200 lbs) buoyant  |
| Electrical Power: | 375 VDC, 600 watts max, 375 watts nominal                                      |

### TOPSIDE DATA ACQUISITION (DAC)

*Two computers are provided, one for the side scan/bathymetry and one for the sub-bottom*

|                    |   |
|--------------------|---|
| Operating System:  | Windows XP  |
| Storage:           | Large capacity hard drive, writable CD/DVD  |
| Network Interface: | 2 x 100base T Ethernet (compatible with ADSL high-speed communications interface) |
| Serial:            | 4 x RS-232, 6 x USB, 1 x Parallel   |
| Display Monitor:   | 20" flat panel  |

### TOPSIDE INTERFACE UNIT

|                    |  |
|--------------------|--|
| Power Supply:      | Input 120/240 VAC auto sensing, output 300 VDC |
| Network Interface: | Ethernet                                       |

### SOFTWARE

|                               |   |
|-------------------------------|---|
| C3D Controller (Proprietary): | Standard  |
| Acquisition:                  | Triton® Isis (standard) – side scan/bathymetry<br>Triton® SB-Logger (standard) sub-bottom |
| Post-Processing:              | Many third party available  |
| Data Format:                  | XTF, SEG-Y  |

### CABLES

|                                      |   |
|--------------------------------------|---|
| Call for specific cable requirements |   |
| Kevlar Deck Cable:                   | 100 m coax (standard)   |
| Double armored:                      | Co-axial cable (for use with ADSL communications link (optional)) |

\*NOTE: Resolution stated is dependent on data communication method. Some communication methods require the data to be decimated to match available band width.



## C3D-AUV (Autonomous Underwater Vehicle)

# C3D-AUV Kit



### Specifications

#### Electronic Bottle

|                        |                         |
|------------------------|-------------------------|
| Weight in air:         | 29 kg (64 lbs)          |
| Weight in fresh water: | 10 kg (20 lbs negative) |
| Weight in salt water:  | 9 kg (19.5 lbs)         |

#### C3D-AUV Transducer

|                |              |
|----------------|--------------|
| Weight in air: | 5 kg (9 lbs) |
|----------------|--------------|

#### Standard 200 kHz Transducer (for weight comparison)

|                       |                |
|-----------------------|----------------|
| Weight in air:        | 6 kg (13 lbs)  |
| Weight in salt water: | 1.3 kg (3 lbs) |

### C3D-AUV

The C3D-AUV kit allows the C3D to be used on remote platforms like autonomous and remotely operated vehicles. The C3D-AUV kit is based on the same proven technology as the C3D towed systems. This kit is provided with special software for autonomous operation of the C3D. This software allows the C3D sonar parameters to be controlled remotely by autonomous vehicles. The C3D-AUV kit is offered in two depth ratings 3000 m and 6000 m.

### Applications

The C3D-AUV Kit is ideal for:

- Autonomous Underwater Vehicles (AUV)
- Unmanned Surface Vehicles (USV)
- Remotely Operated Vehicles (ROV)

# C3D-AUV (Autonomous Underwater Vehicle)

## C3D-AUV System Features

Teledyne Benthos offers the C3D technology in a package that is suitable for AUV configurations with diameters of 12 inches and higher. The C3D technology is perfect for AUV application as it provides wide swath side scan imaging and bathymetry data from the same sensor. The operating mode of an AUV system is typically close to the seafloor and this is compatible with the mode of operation of the C3D swath bathymetry.

The standard package is suitable for an AUV of 12 inches diameter and higher. It operates at depths of 3000 m and set-up for power input from 24V to 48V. Data output via Ethernet data logger is not included in this package:

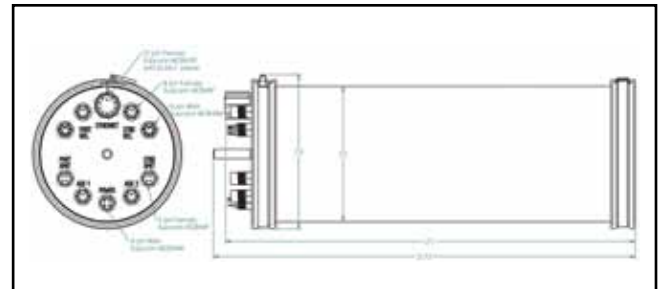
- 6000 m rated package available
- Other power input levels available
- Data logger available
- Dry compartment electronics available

Our AUVs exist in a variety of shapes and sizes. Please contact us for configuration and pricing information before ordering.

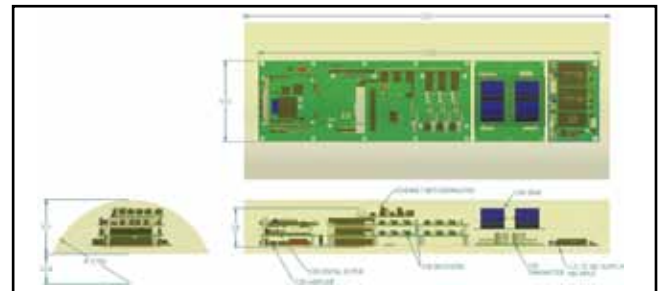


Wet compartment bottle is designed to fit a wide variety of autonomous underwater vehicles.

### Wet Compartment Bottle



### Dry Compartment



Electronic boards (custom option dry compartment)

## Chirp III Sub-Bottom Profiling System

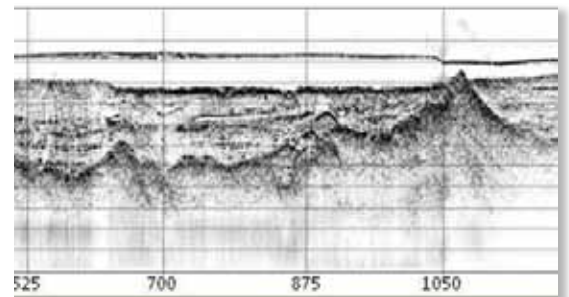
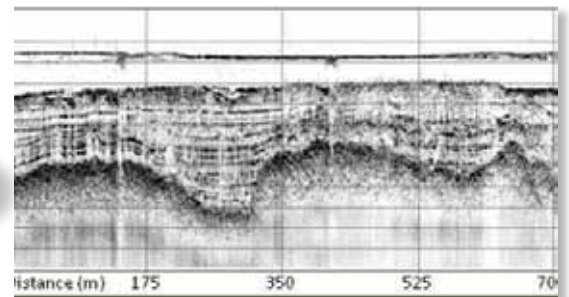
# Chirp III

## Sub-Bottom Profilers



### Lightweight, low-cost vehicle for sub-bottom profiling in both deep and shallow water

Teledyne 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.



### Applications

- Off-shore hazard surveys
- Pipeline & small object surveys
- Bridge piling scour & environmental surveys
- Mining & dredging

# Chirp III Sub-Bottom Profiling System

## Sub-Bottom Profiler

The TTV-170 and the TTV-290 series of tow vehicles are designed for hydrodynamic stability in most Towing applications. The stainless steel midplate construction provides users with a rigid and stable platform to mount additional sensors. The high visibility yellow polyethylene covers are designed to handle years of use. These new and improved shells are more resistant to impact than fiberglass models, and are easy and cost effective to modify or replace.

- The TTV-170 series vehicle is ideal for small vessel applications.
- The TTV-290 series vehicle offers the customer better sub-bottom penetration and resolution than the TTV-170 and in addition it offers an upgrade path to C3D with sub-bottom.

**TTV-170 Series  
Tow Vehicle**



**TTV-290 Series  
Tow Vehicle**



## SUBSEA UNITS

### TTV-171

#### TTV-170 Series Single Channel Chirp Tow Vehicle (3-200 meters)

This tow vehicle includes (1) Low frequency (2-7 kHz) transmit projector (AT-471), receive hydrophone array, and all interconnecting cables.

### TTV-172

#### TTV-170 Series Dual Channel Chirp Tow Vehicle (3-200 meters)

This tow vehicle includes (1) low frequency (2-7 kHz) transmit projector (AT-471), (1) high-frequency (10-20 kHz) transmit projector (AT-12D7), receive hydrophone array, and all interconnecting cables.

### TTV-291

#### TTV-290 Series Single Channel Chirp III, Tow Vehicle (200 meters)

TTV-290 tow vehicle includes a 2x2 low frequency (2-7 kHz) transducer array (AT-471), receiving hydrophone, and all interconnect cables.

### TTV-292

#### TTV-290 Series Dual Channel Chirp III, Tow Vehicle (200 meters)

TTV-290 tow vehicle includes a 2x2 low frequency (2-7 kHz) transducer array (AT-471), (1) high-frequency (10-20 kHz) transmit projector (AT-12D7), receiving hydrophone, and all interconnect cables.

# Chirp III Sub-Bottom Profiling System

## Surface Units

### TRANSCEIVERS

#### Single Channel Chirp III Transceiver

##### Part Number

##### Description

**DSP-6651** ..... Includes a 4KW power amplifier, analog preamplifier gain 0, +15dB, +30dB and single analog input channel, DSP hardware which provides the user with matched filter or digital processing for analog sources and multi-task operations.

#### Dual Channel Chirp III Transceiver

**DSP-6652** ..... Includes a 4KW power amplifier, analog preamplifier gain 0, +15dB, +30dB and dual analog input channel, DSP hardware which provides the user with matched filter or digital processing for analog sources and multi-task operations.

**Chirp III Transceiver**  
(Product Numbers: DSP-6651/DSP-6652)



#### Digital Acquisition Computer (DAC)

This industrial rackmount computer comes in a rugged case that is designed for optimum acquisition performance and durability. It comes with a high-end Intel processor. The hard drive offers ample room for data storage and is minimally 500GB in size. This computer also offers a gigabyte Ethernet connection. In addition, DACs come with a high-resolution 20 inch flat screen monitor, a full function keyboard and a mouse.

**DAC-110** ..... Computer with **Triton® SB-Logger** software (for single channel systems)

**DAC-120** ..... Computer equipped with **Chesapeake® SonarWiz.SBP** software (For single or dual channel systems)

See pages 37 for software package descriptions.

#### Digital Acquisition Computer with Monitor

**Note:** laptop options available



# Chirp III Sub-Bottom Profiling System

## Miscellaneous

### Kevlar Cables (Deck Only - Not for Towing)

| Part Number   | Description   |
|---|---|
| 011022 .....  | Kevlar deck only multi-conductor cable with terminations - 75 M |
| ES Length .....   | Additional length of Kevlar multi-conductor cable – per meter   |
| Example: A 100 meter cable would be priced as a 75 meter cable with 25 meters of extra cable @ \$30/meter |   |

### Armored Cables (Tow Cable)

|                 |   |
|-----------------|---|
| 011021 .....    | Armored tow multi-conductor cable 0.50" dia. - 150M                       |
| ES Length ..... | Additional length of armored multi-conductor cable 0.50" dia. - per meter |

### TTV-290 Series Shipping Containers

| Part Number  | Description  |
|--------------|--|
| 012692 ..... | Wood crate for TTV-290 series tow vehicle + cable + transceiver    |
| 012207 ..... | Rugged plastic shipping case for DAC, monitor, keyboard and manual |

### TTV-170 Series Shipping Cases

| Part Number  | Description  |
|--------------|--|
| 014422 ..... | Rugged plastic case TTV-170 series vehicle and cable |
| 014421 ..... | Rugged plastic shipping case for DAC and transceiver |



**Case for Transceiver and Computer**  
(Part Number: 014421)

**Case for TTV-170 Series Vehicle and Cable**  
(Part Number: 014422)





## Chirp III Sub-Bottom Profiler

# Integrated Packages

### Single Channel Chirp Vehicle Packages - TTV-170 Series

| Part Number        | Description   |
|--------------------|---|
| <b>Chirp III-1</b> | <b>Chirp III Single Channel Tow Vehicle Package</b>                     |
| TTV-171            | Single channel chirp tow vehicle  |
| DSP-6651           | Single channel chirp III transceiver                                    |
| DAC-110            | Rackmount computer for sub-bottom profile with Triton® SB-Logger        |
| 011022             | Kevlar deck only cable multi-conductor - 75 m                           |
| 014422             | Rugged plastic case TTV-170 Series vehicle and cable                    |
| 014421             | Rugged plastic shipping case for DAC and transceiver                    |
| <b>Chirp III-2</b> | <b>Chirp III Single Channel Tow Vehicle Package</b>                     |
| TTV-171            | Single channel chirp tow vehicle  |
| DSP-6651           | Single channel chirp III transceiver                                    |
| DAC-120            | Rackmount computer for sub-bottom profile with Chesapeake® SonarWiz.SBP |
| 011022             | Kevlar deck only cable multi-conductor - 75 m                           |
| 014422             | Rugged plastic case TTV-170 series vehicle and cable                    |
| 014421             | Rugged plastic shipping case for DAC and transceiver                    |

### Single Channel Chirp Vehicle Packages

|                    |   |
|--------------------|---|
| <b>Chirp III-4</b> | <b>Chirp III Single Channel Tow Vehicle Package</b>                     |
| TTV-291            | Single channel chirp tow vehicle  |
| DSP-6651           | Single channel chirp III transceiver                                    |
| DAC-110            | Rackmount computer for sub-bottom profile with Triton® SB-Logger        |
| 011022             | Kevlar deck only cable multi-conductor - 75 m                           |
| 012692             | Wood crate for TTV-290 series tow vehicle + cable + transceiver         |
| 012207             | Rugged plastic shipping case  |
| <b>Chirp III-5</b> | <b>Chirp III Single Channel Tow Vehicle Package</b>                     |
| TTV-291            | Single channel chirp tow vehicle  |
| DSP-6651           | Single channel chirp III transceiver                                    |
| DAC-120            | Rackmount computer for sub-bottom profile with Chesapeake® SonarWiz.SBP |
| 011022             | Kevlar deck only cable multi-conductor - 75 m                           |
| 012692             | Wood crate for TTV-290 series tow vehicle + cable + transceiver         |
| 012207             | Rugged plastic shipping case  |

\*See pages 44 for software package descriptions.



# Chirp III Sub-Bottom Profiler

## Integrated Packages

### Dual Channel Chirp Vehicle Packages

| Part Number        | Description   |
|--------------------|---|
| <b>Chirp III-3</b> | <b>Chirp III Dual Channel Tow Vehicle Package</b>                       |
| TTV-172            | Dual channel chirp tow vehicle  |
| DSP-6652           | Dual channel chirp III transceiver                                      |
| DAC-120            | Rackmount Computer for sub-bottom profile with Chesapeake® SonarWiz.Map |
| 011022             | Kevlar deck only cable multi-conductor - 75 m                           |
| 014422             | Rugged plastic case TTV-170 series vehicle and cable                    |
| 014421             | Rugged plastic shipping case for DAC and transceiver                    |

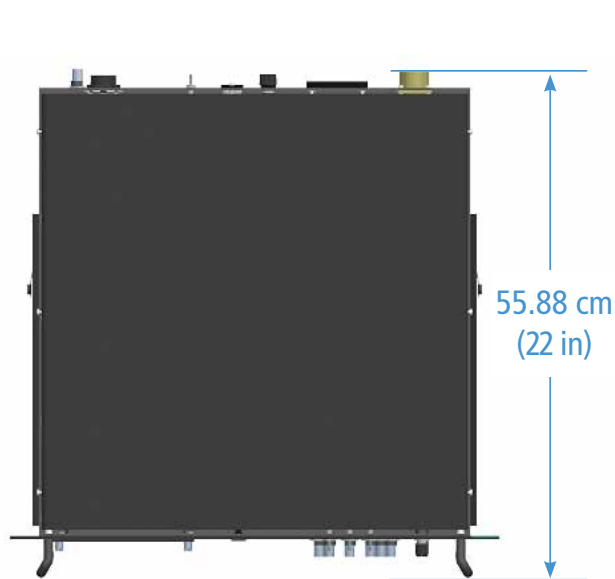
### Dual Channel Chirp Vehicle Packages

|                    |   |
|--------------------|---|
| <b>Chirp III-6</b> | <b>Chirp III Dual Channel Deep Tow Vehicle Package</b>                  |
| TTV-292            | Dual channel chirp tow vehicle  |
| DSP-6652           | Dual channel chirp III transceiver                                      |
| DAC-120            | Rackmount computer for sub-bottom profile with Chesapeake® SonarWiz.SBP |
| 011022             | Kevlar deck only cable multi-conductor - 75 m                           |
| 012692             | Wood crate for TTV-290 series tow vehicle + cable + transceiver         |
| 012207             | Rugged plastic shipping case for DAC, monitor, keyboard and manual      |

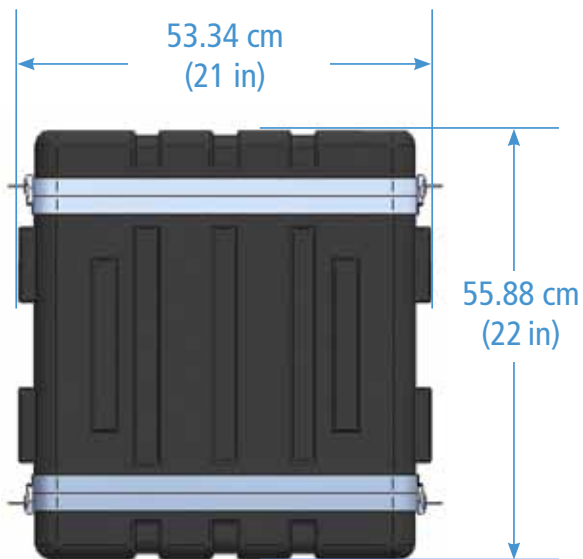
\*See pages 37 for software package descriptions.

## Chirp III

# Dimensional Drawings



**Chirp III Transceiver**  
(DSP-6651/DSP-6652)

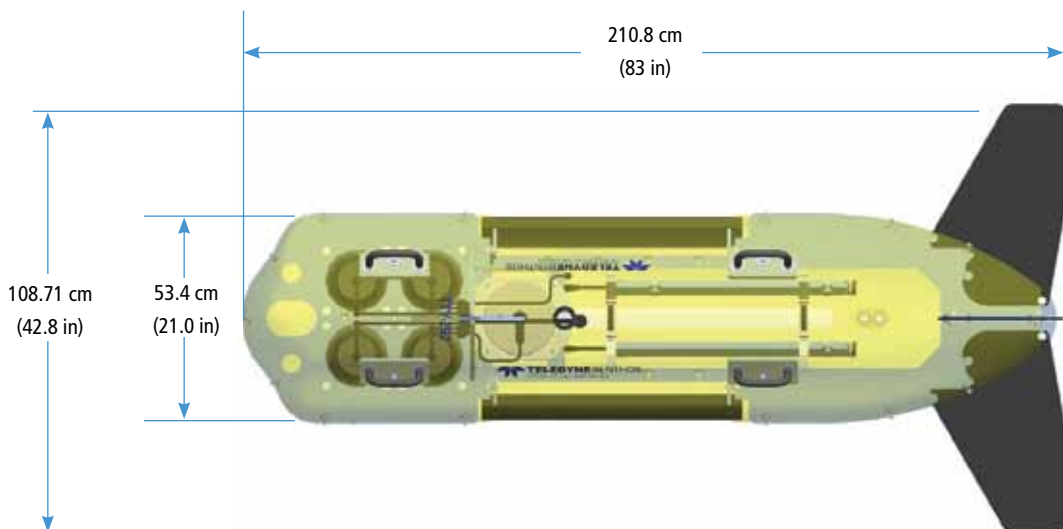
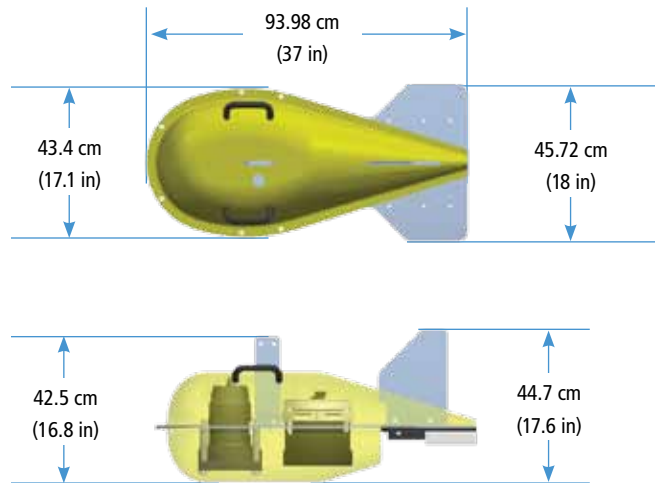


**DAC Rackmount**  
(without monitor)

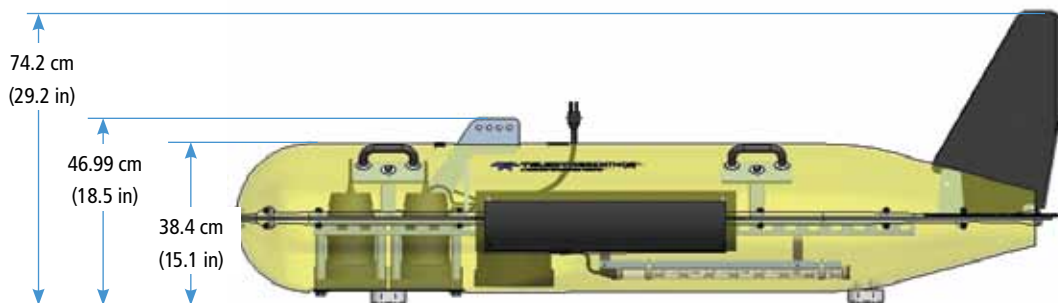
# Chirp III

## Dimensional Drawings

**TTV-170 Series  
Tow Vehicle**



**TTV-290 Series  
Tow Vehicle**



**TTV-290 Series  
Cross-Section**



## Chirp III Sub-Bottom Profiling System

# Specifications

### SYSTEM

|                          |  |
|--------------------------|--|
| Low Frequency:           | Chirp FM sweeps from 2 to 7 kHz  |
| High-frequency:          | Chirp FM sweeps from 10 kHz to 20 kHz  |
| Maximum Operating Depth: | TTV-170 Series (200 m)<br>TTV-290 Series (200 m)   |
| Ping Rate                | 15 pings/second maximum  |
| Pulse Length:            | User selectable from 5 msec to 60 msec max. (ping rate dependant). Pulse waveforms stored in memory. |
| Transducers              | AT-471, Chirp bands 2 to 7 kHz<br>AT-12D7, Chirp bands 10 to 20 kHz                                  |

### TOW VEHICLE (TTV-171/TTV-172)

|                      |                                       |                |
|----------------------|---------------------------------------|----------------|
| Construction:        | Stainless steel, polyethylene         |                |
| Length:              | 94.0 cm (37 in)                       |                |
| Front Cross Section: | 32.4 cm x 43.4 cm (12.7 in x 17.1 in) |                |
|                      | <b>TTV-171</b>                        | <b>TTV-172</b> |
| Weight (in air):     | 34 kg (75 lbs)                        | 41 kg (90 lbs) |
| Weight (in water):   | 20 kg (45 lbs)                        | 25 kg (55 lbs) |

### TOW VEHICLE (TTV-291/TTV-292)

|                      |                                     |                  |
|----------------------|-------------------------------------|------------------|
| Construction:        | Stainless steel, polyethylene       |                  |
| Length:              | 210.8 cm (83 in)                    |                  |
| Front Cross Section: | 38.4 cm x 53.4 cm (15.1 in x 21 in) |                  |
|                      | <b>TTV-291</b>                      | <b>TTV-292</b>   |
| Weight (in air):     | 122 kg (270 lbs)                    | 129 kg (285 lbs) |
| Weight (in water):   | 75 kg (65 lbs)                      | 102 kg (225 lbs) |

### TOPSIDE DATA ACQUISITION COMPUTER (DAC)

|                    |  |
|--------------------|--|
| Operating System:  | Windows XP                                 |
| Storage:           | Large capacity hard drive, writable CD/DVD |
| Network Interface: | 2 x 100 base T Ethernet                    |
| Serial:            | 4 x RS-232, 6 x USB, 1 x parallel          |
| Display Monitor:   | 20 inch Flat Panel                         |

### TOPSIDE TRANSCIVER

|                    |   |
|--------------------|---|
| Power Supply:      | Input 120/240 VAC auto-sensing, output 4 kw per channel maximum |
| Network interface: | Ethernet  |
| Dimensions:        | 4U Rack mount 48.3 cm (19 in)                                   |

### SOFTWARE

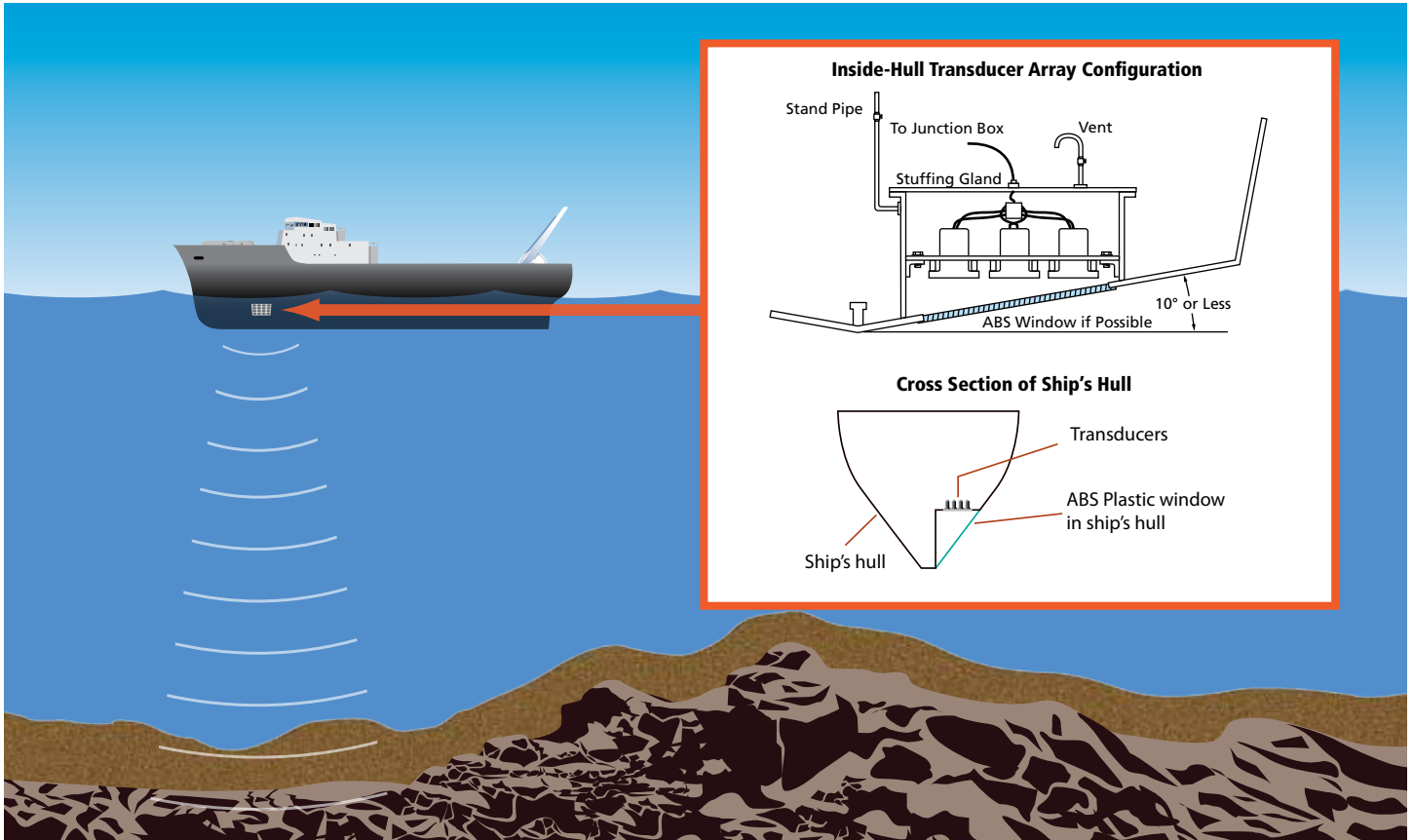
|                             |                     |
|-----------------------------|---------------------|
| Acquisition:                | Triton®, Chesapeake |
| Post-Processing (optional): | Triton®, Chesapeake |
| Data Format:                | SEG-Y               |

### CABLES (Call for specific cable requirements)

|                         |                                |
|-------------------------|--------------------------------|
| Kevlar Deck Only Cable: | 75 m multi-conductor (default) |
| Armored Tow Cable:      | Multi-conductor cable          |

## Chirp III

# Chirp III Hull Mount



## Chirp III Hull Mount

- HMA-1 Hull Mount - High-frequency transducer: hull mount configuration with an operating frequency of 10-20 kHz, (1) transducer transmit/receive transducer configuration hardware and sea chest interconnect cables.
- HMA-4 Transducer Hull Mount Array - Shallow water option includes: four transducers (2x2) (2-7 kHz), transmit/receive array, configuration hardware and sea chest interconnect cables.
- HMA-9 Transducer Hull Mount Array - Shallow water option includes: nine transducers (3x3) (2-7 kHz), transmit/receive array, configuration hardware and sea chest interconnect cables.
- HMA-16 Hull Mount Array - Full Ocean includes: 16 transducers (4x4) (2-7 kHz), transmit/receive array, configuration hardware and sea chest interconnect cables.





## Miscellaneous

# Software Options

Teledyne Benthos offers a variety of software packages to support our sonar imaging systems. Our collaboration with outside software vendors assures that you will have access to the last innovations in underwater software programs that are compatible with Teledyne Benthos Geophysical Systems.

### **Chesapeake® Technology, Inc.**

SonarWiz.Map, Chesapeake Technology's flagship product for real-time mosaics, is currently being offered as an option to SonarWiz customers who require real-time mosaic capabilities in an easy to use and affordable package. It also provides complete post processing capabilities. Features include automatic gain control, time varied gain, beam angle correction, integrated bottom tracker and navigation editor. Complete post-processing functions are also included.

**Compatible Subsea System:** Chirp III, C3D

### **Triton® Imaging, Inc.**

Triton Isis® Bathy is a complete bathymetric acquisition and processing package ready to be interfaced to any multibeam sonar. This product delivers all features of an advanced bathymetry acquisition system and is the tool of choice for a variety of applications including: archeology, environmental studies, oceanography, and hydrography. Triton Isis® Bathy™ integrates external sensors including GPS, MRU, SVP, & gyros and correctly logs and geo-references multibeam data. All data are stored in Triton's non-proprietary XTF format, an industry standard for multibeam and side scan sonar data.

**Compatible Subsea Systems:** C3D-TOW, C3D-LPM

Triton Isis® SB-Logger™ is a state-of-the-art sub-bottom profiler and shallow seismic data acquisition, playback and processing system. It is designed for easy setup and operation. Extraordinary features include a modern and intuitive user interface with recoverable "favorite" settings; prominent color coded warning messages for real-time quality control, and simplified interfaces showing only those parameters critical for accurate data acquisition. Innovative real-time and playback capabilities include a "scrubbing" tool and memory for rapid data review and analysis; image capture tools for export of selected profile sections as annotated bitmap files; and a variety of optional filters designed to enhance imagery and improve interpretation results.

**Compatible Subsea Systems:** C3D-SBP, Chirp III

### **Hypack®, Inc.**

HYPACK® SURVEY is a fully integrated hydrographic software package for survey design, data collection, navigation and positioning. HYPACK® SURVEY allows the user to design survey, including line planning and collect data for bathymetric magnetometer, side scan sonar, sub-bottom and ADCP surveys. Included in HYPACK survey is the side scan interface. This module allows for the collection of all analog and most digital side scan sonars, providing waterfall and signal windows for single and dual frequency systems, target analysis and measurements, and provide a real time mosaic to visualize sonar data and swath coverage.

**Compatible Subsea Systems:** C3D-TOW, C3D-LPM, C3D-SBP

### **Oceanic Imaging Consultants**

GeoDAS can acquire and process bathymetry from single and multi-beam sensors. Default on-screen tools display 2D bathymetry and bathymetric ping profiles, while the 3D Bathymetric tool can display evolving bathymetric data in real time. The bathymetry properties window allows you to fine-tune bathymetric processing and display, and subwindows for interferometry and latency calibration, as well as tide tool and draft settings windows allow further fine-tuning.

**Compatible Subsea Systems:** C3D-TOW, C3D-LPM

### **QPS (Quality Positioning Services)**

The key technology of QPS is based on the collection and presentation of large volumes of navigation and depth data, all in real-time. This also includes techniques in 3D visualization of the underwater environment. The systems of QPS are used onboard offshore construction vessels, pipe-lay barges, drilling rigs, seismic research vessels and hydrographic survey vessels. QPS has a fast growing market share in the offshore oil and gas industry, dredging industry and ports.

QINSy is perfect for a wide variety of applications:

- Hydrographic and oceanographic surveys
- Offshore pipeline inspection and pipe-laying
- Dredging, marine construction including offshore oil and gas
- ROV and AUV tracking and data collection
- Barge, tug and fleet management
- Chart and ENC production

**Compatible Subsea System:** C3D-TOW, C3D-LPM



## Terms & Conditions

Seller's Offer, and any order issued by Buyer to Seller for the goods and/or services specified herein, is strictly limited to Seller's Terms and Conditions of Sale, which can be found at [www.benthos.com](http://www.benthos.com)



## Miscellaneous

# Miscellaneous Shipping Weights & Dimensions

| PRODUCT                                    | CONTAINER    | WEIGHT (lb/kg) | DIMENSIONS<br>LxWxH (in/cm) |
|--|--------------|----------------|-----------------------------|
| TTV-290<br>(C3D, C3D-SBP, 1625, Chirp III) | Wooden Crate | 680 / 308      | 87x33x46 / 221x84x117       |
| C3D-LPM                                    | Gray Case    | 131 / 59       | 42x27x22 / 107x69x56        |

**Note:** Shipping Weights and Dimensions are provided as a guideline only. Actual weights and dimensions will vary depending on system configuration and number of components purchased.

**50** Years of   
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1962-2012



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