

**DIGIBAR-Pro**  
**PROFILING SOUND VELOCIMETER**  
**OPERATION MANUAL**

**Software Version 1.XX**

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# 1 INTRODUCTION

The Operation manual contains information required to operate and field test the DIGIBAR-PRO Model 1200 hand-held sound velocimeter.

## 1.1 Instrument Description

DIGIBAR-PRO is a third generation velocimeter employing the sing-around method of sound velocity determination. Building on more than 15 years of experience in manufacturing velocimeters used in calibrating echo sounders, this latest version of the DIGIBAR-PRO is tailored for the advanced applications practiced in the field today. The unit not only samples, displays, and stores values for the speed of sound in water, but it also ties each collected value to a precise depth. Built for real world use, the rugged instrument is made up of a hand-held controller (splash rated to IP-65), a Kevlar reinforced cable (with a 400 lb. breaking strength rating), and a marine grade stainless steel probe.



**Figure 1. 1**  
DIGIBAR-PRO  
Profiling Sound Velocimeter

The velocity of sound and depth values displayed on the DIGIBAR-PRO front panel are measured, stored in memory, and displayed by the system's internal microprocessor and its associated circuitry. The processor applies Del Grosso's formula to the sing-around frequency calibration constants, yielding accurate and traceable velocity results. The addition of a pressure sensor to the velocimeter probe lends new versatility to the instrument. Calibration of single beam echo sounders using the earlier model DIGIBAR was always easier to accomplish than the traditional "bar check" method of velocity determination and that utility has been maintained in the new DIGIBAR-PRO. The addition of precise profiling capabilities to the new model means that multi-beam echo sounders are now able to utilize the output of the DIGIBAR-PRO directly in their critical ray-bending calculations.

## **1.2 Theory of Operation**

Mounted near the end of the sampling probe is the high frequency "sing-around" transducer and its associated reflector. This precisely spaced pair is used to measure the velocity of sound in water by transmitting and receiving a signal across their known separation distance. After the first transmission, the received echo is gated and introduced into the feedback loop of an oscillator that re-triggers the transmitter and begins the cycle again. The frequency resulting from this regenerative feed-back loop is determined by the distance the signal travels (transducer to reflector and back) and is directly proportional to the velocity of propagation of the sound pulse through the measured medium (in this case water). This method of direct sampling means that all factors that influence the speed of sound, including salinity, pressure, and temperature, are taken into account. An embedded RISC processor in the probe digitizes the sing-around frequency and depth information, sending that data along with temperature and calibration constants in ASCII format via a 2 wire current loop up the cable to the hand-held control unit at a 10 Hz rate.

In the control unit, another microprocessor accepts data from the probe, converting the frequency information to sound velocity, and the pressure data into depths, storing them in internal memory. In addition to converting both values to usable units, the control unit provides an easy to use operator interface. The multi-line display and system of menus guide the operator through the steps required to complete a successful velocity cast. Other features of the control unit include, data storage space, interfacing circuitry for transmission of collected data to a PC, and a power source (three Alkaline C-cells) for driving both the probe and its own internal circuitry. The velocity and depth information collected from up to 10 casts can be stored in DIGIBAR-PRO's internal memory. The average velocity value of each cast can be calculated, or the entire velocity profile of the cast can be up-loaded to a PC, in spreadsheet format, for subsequent use in ray-bending calculations.

### 1.3 Features

The following is a list of standard DIGIBAR features:

- Velocity and depth displayed in feet or meters
- Automatic storage of up to 10 complete casts
- Computed average of all stored velocity samples in one cast or
- Up-loading of cast data to an external computer in spreadsheet format
- Review and editing of all stored cast data
- Durable sealed hand-held control unit
- 4 line x 40 character Transflective LCD display for readability in bright sunlight
- Low drag high breaking strength cable
- Compact probe
- Low battery indicator
- Operates on 3 standard "C" cell batteries
- Operates in fresh, brackish, or salt water

#### 1.3.1 GENERAL SPECIFICATIONS

##### Velocity / Depth Probe

Sing-Around Frequency:	11 kHz
Communications:	RS485, 19.2 k Baud
Temperature Range:	4° to 30° C Typical
Sample Rate:	10 Hz
Depth Sensor Accuracy:	> 1.0 ft (31.0 cm)
Dimensions:	14.71 x 2.0d inches (37.31 x 5.0d cm)
Weight:	4.0 lb. (1.8kg)
Depth Rating	NTE 100m

##### Hand-held Control Unit

Velocity Range:	4595 – 5250 ft/sec (1400 – 1600 m/sec)
Resolution:	0.1 ft/sec (0.1 m/sec)
Accuracy:	± 1.0 ft/sec (±0.3 m/sec)
Power Requirement:	Three "C" cell Alkaline Batteries
Communications:	RS232, Selectable Baud Rate
Dimensions:	11.41 x 5.5w x 3.7d inches (29.01 x 14.0w x 9.4d cm)
Weight:	2.6 lb. (1.2 kg)

##### Cable

Construction:	4 Conductor, Kevlar reinforced, and Polyethylene jacket
Diameter:	0.27 in. (6.9mm)
Breaking Strength:	400 lb. (182 kg)

## 1.4 Control Unit Front Panel Description

All controls on the unit's front panel as well as the LCD display are sealed to prevent water damage. As seen in Figure 1.2 below, the simple scheme of left, right, up, and down arrows, plus enter and escape keys, coupled with the scrolling display menu system makes the DIGIBAR-PRO quite straight-forward and easy to operate.



**Figure 2. 2**

### **DIGIBAR-PRO**

Profiling Sound Velocimeter  
Key Pad Illustration

## **1.5 Probe/Cable Description**

The velocimeter/depth probe, in its standard configuration, is connected to the hand-held control unit via a low drag (0.27 in. (7mm)), 60-foot (20 m) long, multi-conductor cable. The cable is designed to withstand the rigors of long use in the field, having an internal Kevlar strength member and a heavy polyethylene outer jacket. Additional weight may be added to the cable (up to 25lbs. total) in order to depress the probe in high current conditions. Alternative cable lengths of up to 100m (328 ft.) can be supplied upon request.

Although great care was taken in the design of the probe to assure maximum strength and durability, it should not be dropped or otherwise subjected to unusual mechanical stress. All components in the acoustic signal path are of stainless steel alloys, selected for their corrosion resistance and low coefficient of thermal expansion. In order to minimize the possibility of corrosion damaging the probe and cable deterioration, they should be washed down in fresh water and allowed to dry before storage.

The velocimeter/depth probe is made up of the following 9 individual components:

- Cable penetrator (plus cable strain relief, PC board, and O-rings)
- Probe body (SS tube)
- Transceiver board
- Processor board
- Velocity transducer
- Pressure transducer
- Transducer penetrator (plus O-rings)
- Spacers (3 ea.)
- Reflector plate

Should the DIGIBAR cable require replacement, the penetrator can be removed at the probe and the cable disconnected at the control unit. Replacement of the cable does not require recalibration of the instrument. However, removal or replacement of other probe components should not be attempted since their position and or settings are generally critical to calibration.



## 2 OPERATION

Both the membrane switches and display on the control unit's front panel are sealed, and all openings in the body of the housing are gasketed in order to prevent water damage. However, it is a good idea to minimize the unit's unnecessary exposure to the elements in order to prevent possible long-term damage due to corrosion. To prevent unnecessary battery drain, the unit is powered down automatically after 10 minutes of inactivity (no switches are pressed).

### 2.1 *Pre-Operation Checks*

The probe should be inspected before deployment to assure that no foreign materials are present in the acoustic path. The face of the transducer and the reflector plate should be clean and free of debris. The probe can be cleaned with mild soap and water without damage, should the need arise.

### 2.2 *Deployment*

Probe deployment is as simple as lowering the unit over the side to the desired depth, and then retrieving the unit. However, a few operational considerations should be kept in mind while making velocity casts.

**Safety should be a primary concern of the operator!** The probe should never be dropped into areas where it may become entangled in underwater obstructions. Deployment of the probe in the vicinity the ship's propellers is not only unwise, due to the risk of damage to the equipment, but it is extremely unsafe as well.

When deploying the unit in bodies of water with little or no current, air bubbles can become attached to the face of the probe or the reflector plate. Any accumulation of bubbles will disrupt the operation of the velocimeter. However, they can be removed easily by gently swinging the probe back and forth under the surface of the water.

### 2.3 Initial Configuration

Power **ON**

**Depress and hold the power button for 3 seconds.**

The display will show the **Header Screen** for 1 second:

Digibar Pro v x.xx  
S/n DB98xxx  
Odom Hydrographic  
Systems, Inc.

The **Header Screen** will disappear and be replaced by the **Main Menu**. The initial cursor position is opposite the **Acquire** sub menu.

**NOTE:** Before starting the first velocity cast the conditions or parameters of the cast should be examined and adjusted as necessary.

**Main Menu**

▶ Acquire  
| Review  
▶ Setup  
Comm  
Battery/Probe Power  
Version

From the **Main Menu** select **Setup**. Press the appropriate up and down arrows until the cursor (arrowhead) is positioned opposite **Setup**. Press the **Enter** key to display the **Setup Menu**.

**Setup Menu**

Log Basis	Depth
▶ Depth interval	0.5
Time interval	1
Units	Meters
Surface Detect	off
Store Cast Data	Yes
DepthAvg.	4
VelAvg.	1
Time	11:27:00
Date	09/16/99
Use Default Setup	
Simulator	off
Probe Constants	

## 2.4 Setup Menu Parameters

**Log Basis:** Velocities can be logged in the control unit based on either depth or time. The usual method of producing a velocity profile is to log velocities based on depth. In order to accomplish this task, place the arrowhead cursor on **Log Basis** and press the **Enter** key. One should now note a blinking cursor over the last character of the parameter value. Press the **UP** or **Down** arrow keys. Note that pressing either key causes the value to toggle between **Depth** and **Time**. Pressing the **Enter** key with either **Depth** or **Time** displayed will cause that value to be selected as the current **Log Basis**.

**Depth Interval:** Should **Depth** be chosen as a **Log Basis** value, then the Digibar will log velocities based on changing depths. The **Depth Interval** parameter allows the operator to determine how often and at what depth the velocity is logged. For instance, if the operator selects a depth interval of 1, then every time the depth measured by the probe increases or decreases by 1 unit (either feet or meters as set by the **Units** value) a new velocity will be stored in memory. In addition, the depth value, which triggered the measurement, is stored. Both pieces of data are logged on the trip down to the bottom of the cast and on the way back up toward the water's surface at every selected interval. This duplication can serve as a confirmation of the accuracy of the profile.

**Time Interval:** Time based logging works in much the same way as does depth interval, except of course that the measurement cycle is based on a preset interval of time (1 to 999 seconds) rather than a cycle based on depth. This function would normally be reserved for logging at a fixed depth over a period of time where changes in velocity are expected to occur due to circumstances not necessarily associated with changing depth (flow, turbidity, dissolved minerals, etc.).

**Units:** This parameter enables the operator to change measurement units between meters and feet to suit the requirements of the survey. Should measurement units of feet be selected, then all results, including velocity and depth will be displayed in feet. All measurement results will, of course be displayed to the nearest 0.10 meters should that parameter value be selected.

**Surface Detect:** When selected, this parameter is intended to allow the probe to automatically end a cast once it detects atmospheric air pressure. The **Surface Detect** parameter has not been implemented in version 1.00 firmware.

**Store Cast Data:** This parameter gives the operator the option of either storing velocity and depth in the Digibar's internal memory or simply displaying that information. The only two choices are Yes or No.

**DepthAverage, VelocityAverage:** Digibar-Pro gives the operator the option of either averaging a number of individual measurements in the hope of minimizing the

influence of single bad data points, or storing one data point at each predetermined measurement interval. The results of a cast using a number of averaged velocities for instance would be a somewhat "smoother" profile, which reacts less rapidly to spurious changes as the number of averaged data points is increased. The default value for depth is 4 (four depths are averaged to arrive at the measurement depth) and velocity is 1 (the most recent velocity at the measurement depth is stored).

**Time, Date:** The unit's internal clock / calendar keeps track of the current time and date for record keeping purposes. During a velocity cast, both the time and date of each measurement is stored in the system's memory. Some formats require time and date in the header information, while others require a time and date to be associated with each data point. Since this information is always available in the Digibar, uploading velocity profiles in several different formats is possible.

**Use default setup:** This parameter provides an easy way to return the unit to the standard factory set parameter values. Pressing the ENTER key with *Use default setup* displayed results in the warning message "*Press enter to reset params to factory defaults, any other key to cancel*".

**Simulator:** The system's internal simulator provides a handy method of both displaying the operation of the system and of testing its interfacing capabilities. Once selected, the unit goes through the normal steps required for a velocity cast, however, no probe need be connected in order to complete the simulated cast.

**Probe Constants:** This parameter is intended for use in troubleshooting a suspect velocity probe only. Probe constants are associated with the calibration of the velocimeter transducer and should be adjusted only under the direct supervision of an Odom engineer.

Once the operator is satisfied that the parameters of the cast are properly configured, then press **Esc** to return to the **Main Menu**.

## 2.5 Performing a Velocity Cast

From the **Main Menu**, position the arrowhead cursor opposite the **Acquire** parameter and press the **Enter** key. This will put the unit in the velocity acquisition mode.

### Acquire Menu

▶ Cast	Start
Memory/casts	%100/1
Depth	1.0
Velocity	5,000.0
View All	

**Cast:** Pressing the **Enter** key with the arrowhead cursor positioned opposite the **Cast** parameter initiates velocity and depth data acquisition. The following screen will be displayed:

Lower probe to calibration mark and hit Enter to cast or any other key to cancel
--

Lowering the probe to the calibration depth mark on the cable and pressing the **Enter** key tells the probe's microprocessor to calibrate the depth sensor. This step compensates for changes in atmospheric pressure and improves the accuracy of the depth data.

Once the cast has begun, all values displayed are real time information. As the probe is lowered, the depth value will increase and the velocity value will change as the speed of sound varies. Lower the probe to the depth required by the survey and then retrieve it. The DIGIBAR-Pro will continue to gather depth and velocity information on the trip to the surface just as it did on the way down to the calibration depth.

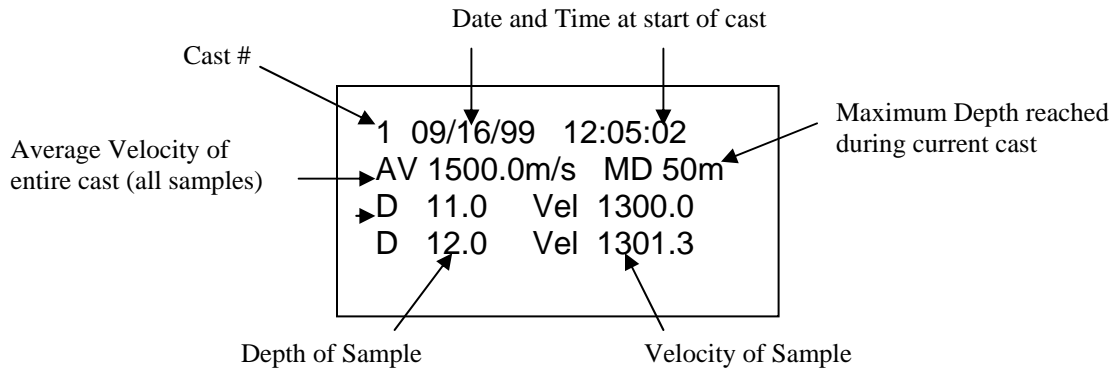
**Please NOTE:** In order to assure the accuracy of the Cast which is underway, **do not** attempt to begin any other function of the unit, such as changing units or running the Test PC routine, while the Cast is still in progress.

Once the velocity/depth probe has been lowered to the designated depth and then retrieved, position the cursor opposite the **Cast** parameter and press the **Enter** key in order to **stop data collection**.

**Acquire Menu**

▶ Cast	Stop
Memory/casts	%100/1
Depth	0.5
Velocity	4,960.0
View All	

As soon as data collection is terminated, the **Review** screen will be displayed.



The **Review** screen gives the operator the opportunity to scroll through all of the individual records taken in the latest cast. This is not intended to be a full editor of long or deep profiles, but rather a quick way to look at individual readings, comparing each to its neighbors to confirm that no individual sample seems to be very far out of bounds. We suggest that the entire cast be uploaded to spreadsheet format if more extensive analysis or editing is required

Should an obviously bad sample be encountered, pressing the **Enter** key with the record selected (arrowhead cursor opposite the record) will start the deletion process.

	1	09/16/99	12:05:02
	AV	1500.0m/s	MD 50m
▶	D	11.0	Vel 1300.0
	D	12.0	Vel 1301.3

The deletion confirmation screen will appear as soon as **Enter** is pressed.

Press enter to  
DELETE this record,  
Or any other key to  
cancel

Pressing the **Enter** key a second time will delete the record from the cast.

## 2.6 *Acquire Parameters*

In the **Acquire** mode, several parameters are displayed to assist in judging the quality of the cast data and for managing data storage.

**Memory/casts:** This parameter displays the percent of memory available for cast data storage, and the number of casts collected. The amount of memory available should alert the operator to the possibility of running out of memory once the number of stored casts begin to approach the upper limit of 10. Casts can be deleted once the data has been uploaded to a computer in order to free up memory space.

**Depth:** Moving the cursor to the Depth position and pressing Enter results in only the real-time depth value being displayed in large (multi-line) characters in the display. Pressing any key will cause the display to revert to the **Acquire Menu**.

**Velocity:** Pressing the Enter key with Velocity selected will result in the speed of sound being displayed in large characters. Pressing any key will cause the display to revert to the **Acquire Menu**.

**View All:** Selecting **View All** causes the display to show both the velocity and depth data on a line by line basis (3 lines displayed at a time) scrolling up from the bottom of the screen.

The same information shown in the **View Cast** screen can be accessed later by going to the **Main Menu** and selecting **Review**. Using the arrow keys, position the cursor opposite **Review** and press the **Enter** key.

### Main Menu

Acquire  
▶ Review  
Setup  
Comm  
Battery/Probe Power  
Version

## 2.7 *Probe Cleaning*

After each operation, the probe should be checked for foreign matter lodged within the sampling chamber. In addition, in order to ensure long term accurate measurements, the probe should be

rinsed with fresh water and dried after each cast. This will minimize the possibility of corrosion affecting the function of the probe.



### 3 Interfacing

#### 3.1 Uploading Information to a PC

Main Menu

```
Acquire
Review
Setup
Comm
▶ Battery/Probe Power
Version
```

After completing a Cast, it will often be desirable to upload the results to a PC in spreadsheet format for further processing or record keeping. To do so, select **Comm** in the main menu and press **Enter**. The screen shown below will be displayed.

Comm menu

```
▶ Output Cast All
1,2,etc.
Output Type CSV
SVP16
NMEA
WGEO
HYPACK
SOUNDER
Output During Yes
No
Baud rate 19200
9600
4800
Test PC
Test probe
```

#### 3.2 Communication Menu Parameters

**Output Cast:** Listed after this parameter are the numbers for each of the casts stored in the unit's memory (from 1 to a possible 10). Selecting **All** and pressing the **Enter** key will result, as the name implies, in all of the casts being output to an external computer. Selecting individual casts by number tells the unit to output only the results of the selected cast. **NOTE:** Please read the section labeled Annotating the Echo Sounder Chart Automatically, later in this chapter.

**Output Type:** The choice of 5 different output formats can be made using the this parameter.

**CSV:** Selecting the **CSV** format option results in the unit sending ASCII data in the following arrangement:

```
# CAST 1 Meters Records 3
09/16/99, 11:33:17, 1503.0,1.5,16.0
09/16/99, 11:33:17, 1503.4,2.0,15.0
09/16/99, 11:33:17, 1503.9,2.5,14.0
```

The **CSV** cast data begins with the header line showing the # of the Cast (#1 in the example), followed by the measurement unit (meters in this example), and by the number of records in the file (in this example only 3 individual samples were stored). Once the header line is complete, each individual record is listed beginning with the date, followed by time, velocity, depth, and probe temperature.

**SVP16:** In this configuration, the Digibar Pro emulates the output string of the SVP 16 sound velocity profiler.

```
"CALC, DBxxxx, 09/16/99, 1, Meters"
OHSI Sound Velocity Profiler S/N DBxxxx
Date: 99259 Time: 1133
Depth Offset (M): 0
Depth (M) Velocity (M/S) Temp (C)
1.5 1503.0 8.5
2.0 1504.2 9.0
2.5 1504.4 9.0
```

**NMEA:** This output string complies with the sentence structure of the NMEA standard for manufacturer's proprietary strings.

```
$PSSV, 1503.0, 1.5,M*54 (for Units = Meters)
$PSSV, 4860.0, 4.0,F*52 (for Units = feet)
```

The "\$" character denotes start of sentence.

"P" Proprietary sentence ID

"SSV" Manufacturer's mnemonic code

"," The comma delimiter character starts each field except address and checksum  
<ccc> Velocity, Depth, Measurement units data fields

"\*" Checksum delimiter

<Checksum field> The absolute value calculated by exclusive-OR'ing the 8 data bits of each character in the sentence between, but not including the "\$" and "\*".

<CR><LF> End of sentence

**WESTGEO:** This sentence complies with the requirements of the current WG-1100 velocimeter output string.

634 01503  
635 01503  
636 01504

The string is composed of a 3-digit sequential event number, followed by a space, and then 5 characters of velocity data. Each record is delimited by a <CR><LF>.

**Sounder:** When the Sounder output string is selected, the Digibar sends a <CTRL>A followed by "Digibar Pro 9999 (Serial No.) 11/08/99 10:45:20 AvgVel 1500.2 (m/s, f/s) MaxDepth 100 (m or ft.).<CTRL>D. **NOTE:** See annotating the Echo Sounder chart automatically in a later section.

**Hypack:** Selection of the Hypack SV Format causes the Digibar Pro to output a header: FTP New followed by the cast data in two columns (depth velocity). All velocity values are in meters/second.

FTP New  
002.5 1500.0  
003.0 1503.1  
003.5 1503.2

*Comm Menu*

Output Cast	All 1,2,etc.
Output Type	CSV SVP16 NMEA WGEO HYPACK SOUNDER
▶ Output During	No Yes
Baud rate	19200 9600 4800
Test PC	
Test probe	

**Output During:** In the majority of operating circumstances, the Hand-held control unit will not be connected directly to a computer or other logging device. It will simply be used as designed as a portable, completely self-contained profiling system. However, the option does exist for echoing the data out the serial port for logging on both the

DIGIBAR-PRO control unit and an external computer. Selection of **Yes under Output During** will cause this to happen.

The output string will be composed of the following:

02/28/02,08:56:02,1484.9,0.0,25.0

**MM/DD/YY, time, velocity, depth, temperature**

In most cases, portable operation will not require data to be output until the entire cast, or a number of casts, are collected. In this case, **Output During - No** should be selected.

**Baud rate:** Select the appropriate rate to match the logging computer's serial port. The default baud rate is 19.2 kbps. with no parity, 8 data bits, 1 start bit, and 1 stop bit.

**Test PC:** If selected, the control unit will display any characters seen on its serial input, and echo those same characters out its serial output.

**Test probe:** Causes raw data from the velocity / depth probe to be displayed and sent out the serial port.

### ***Marking the Echo Sounder Chart Automatically:***

A convenient feature of the Digibar Pro is the capability of the unit to transfer data directly from the hand held control unit to either an Echotrac MKII or a Hydrotrac's chart record. This feature can be used to confirm the velocity value used during a survey and to log the time and date of each velocity cast. The procedure is described below:

- 1) In the **Main Menu**, Select the **Comm** parameter (move the cursor to the position opposite **Comm** and press Enter). Selecting the **Comm** parameter causes the Comm submenu to be displayed.
- 2) Move the cursor to the position opposite **Output Type**. Scroll through the parameters until **SOUNDER** appears and press Enter.
- 3) Confirm that the parameter labeled **Output During** is OFF, and that the **Baud Rate** displayed by the Digibar Pro is consistent with the baud rate of the Hydrotrac or MKII to be marked (9600 by default).
- 4) Connect the standard RS-232 serial cable supplied with the Digibar Pro to the Serial Port. Using the special Digibar Pro to Echotrac/Hydrotrac serial port adapter cable, connect the Digibar Pro to the Com1 serial port of the MKII or the Hydrotrac. **Note:** Establishing communication between the Digibar Pro and the MKII may require that an existing serial port connection (to the data acquisition system for example) be removed.
- 5) Once the cable is connected between the Echotrac/Hydrotrac Com 1 port, move the cursor to the **Output Cast** parameter. Select the cast that is to be printed on the

chart, and press the Enter key. This will cause the Echotrac/Hydrotrac to print the information contained in the Sounder string on the unit's chart. Please note that the actual velocity used by the sounder will **not** be changed as a result of this process! Since the sound velocity value established in the echo sounder is most often established by calibrating using the bar check method, changing the actual velocity in the echo sounder is left up to the operator.

## **4 Warranty**

The manufacturer warrants all equipment to be free from defect in materials or workmanship for a period of one (1) year from date of shipment. All necessary adjustments, repairs, or replacement of equipment manufactured by Odom Hydrographic Systems, Inc. not occasioned by accident, misuse or modification, shall be made by Odom at its own expense during the period of the warranty. Items for repair under terms of the warranty must be returned freight prepaid by the customer to Odom's factory in Baton Rouge, La. U.S.A. The warranty applies to the original purchaser only.

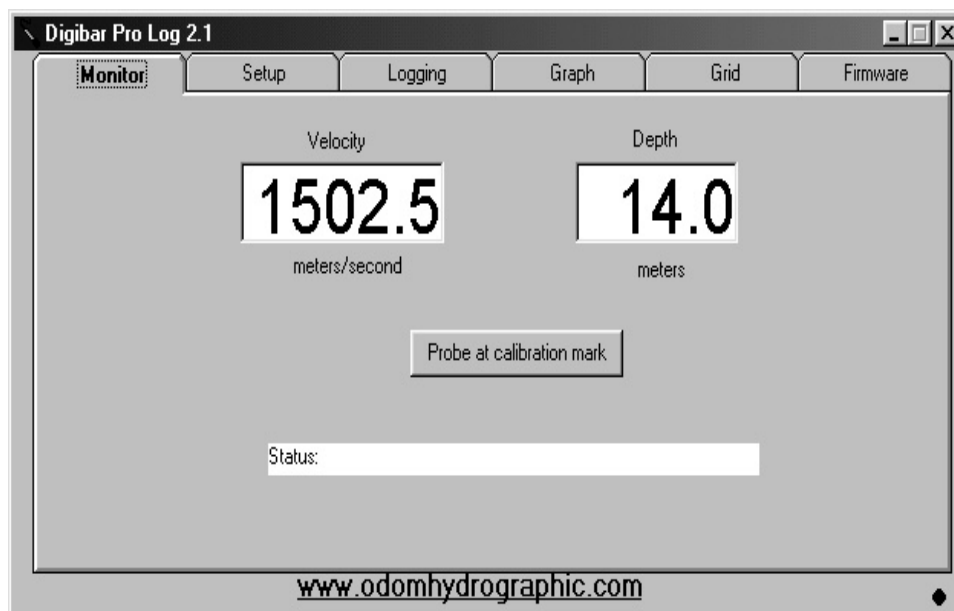
## Appendix 1

### Downloading Examples using Digibar Pro Log 2.1:

#### HYPACK compatible velocity tables:

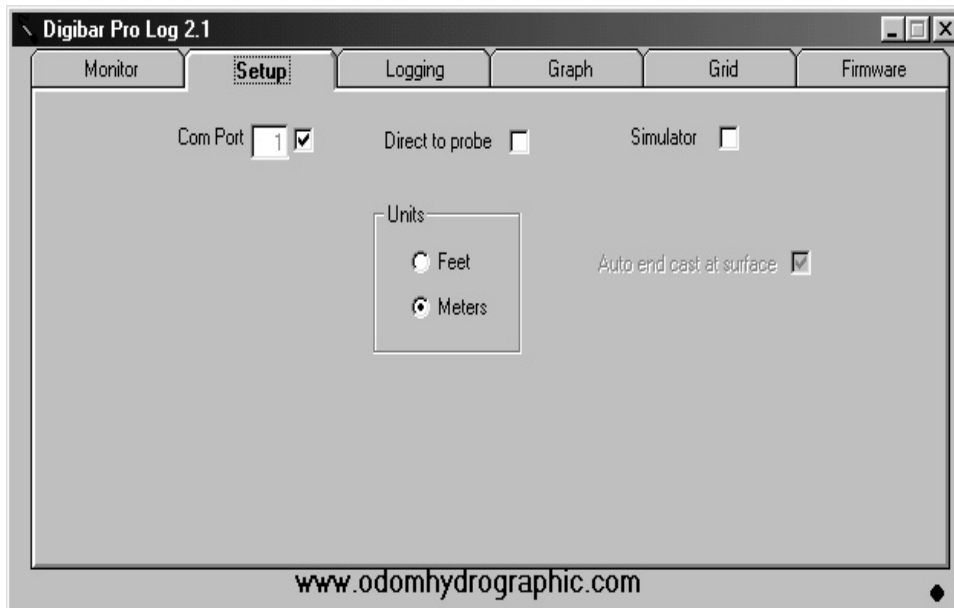
Downloading a velocity cast from the hand held control unit into **HYPACK** assumes that a couple of conditions are satisfied. Namely, that velocities are either converted to or are measured in meters/second, and that the associated data file ends in the file extension ".vel". In addition, HYPACK assumes a "one-way" cast, that is, the cast begins near the surface of the water and ends at the maximum depth. Use of a two-way or round-trip cast remains a good idea for confirming velocities, however one set of data (usually the retrieval data) should be edited out of the cast file before attempting to use the file in HYPACK.

1. Collect a single direction velocity profile (generally surface to maximum depth) in the same measurement units as those used for the survey (feet or meters).
2. Note the cast number and edit the individual samples using the **Review** parameter of the DigibarPro. Delete any obvious bad velocities from the cast. Please note that often the last velocity taken will be at or near the bottom and consequently may be corrupted by bottom sediment in the sampling chamber.
3. Select the **Comm** menu on the DigibarPro control unit and confirm the **Baud Rate is set to 19.2kbs**.
4. Connect the DigibarPro serial cable to an active communications port on the data acquisition PC. **Launch the program DigibarPro Log 2.1**. This program is supplied free of charge with each DigibarPro unit and is available for downloading from our website.

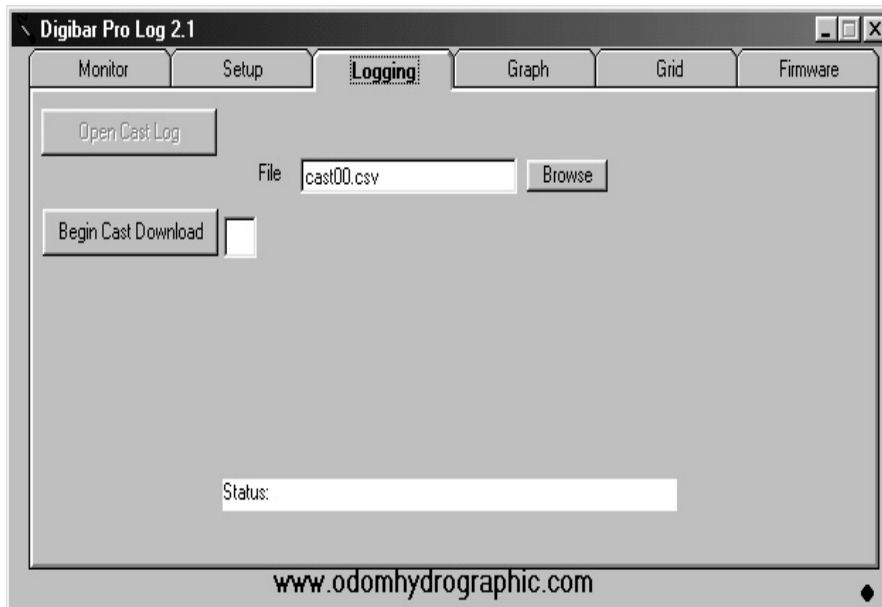


5. On the data acquisition PC, click on the **Setup tab** in Digibar Pro Log, and confirm that:
  - a. The appropriate Com Port on your PC is displayed (Com 1, Com 2, etc.)

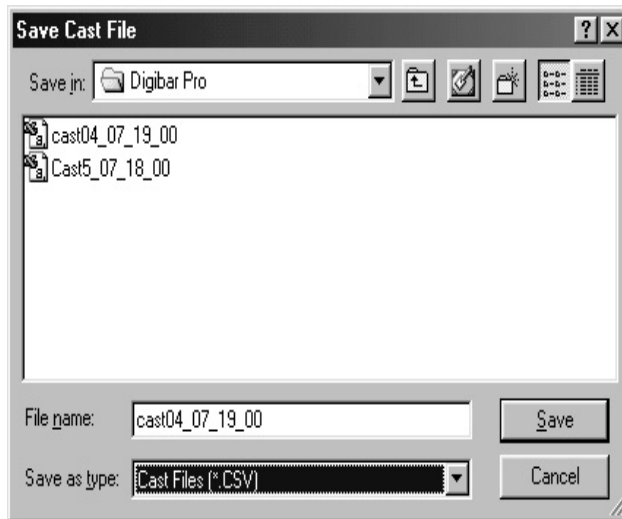
- b. The box next to Com Port is checked and no checks remain in the boxes next to the "direct to probe" or "simulator" buttons.



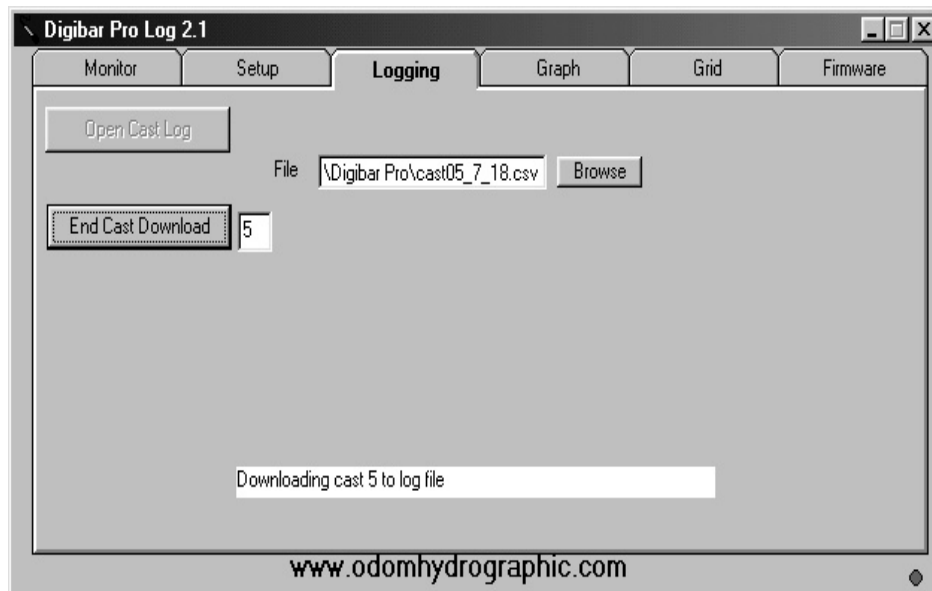
6. Click on the **Logging** tab. The default file name is cast00.csv. Please note that if the operator chooses to change nothing from the default configuration, then the file to be downloaded (in most cases) will be stored at C:/Program Files/Digibar Pro/cast00.csv.



7. Click the **Browse** button and rename the file with a more descriptive name, perhaps one including the date and time, before proceeding. This aids in tracking data from particular casts later on.

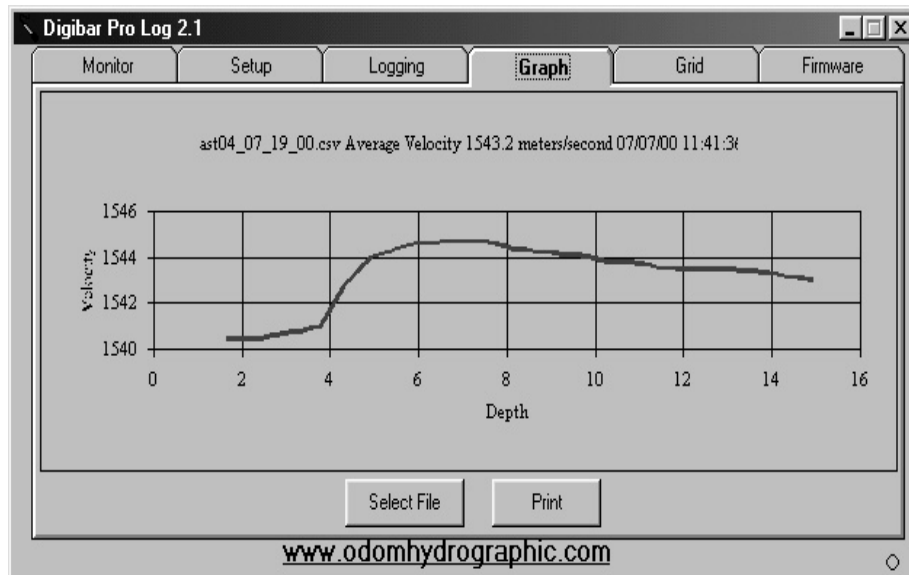


8. Click on the box next to the **Begin Cast Download** button and enter the # of the particular cast in the DigibarPro control unit you wish to download (1 thru 10).
9. Click the **Begin Cast Download** button. Note that the status line at the bottom of the Logging tab will show "**Downloading cast # to log file**", followed by "**Download complete**". In addition, the circle in the lower right hand corner of the screen will change colors while data is being transferred.

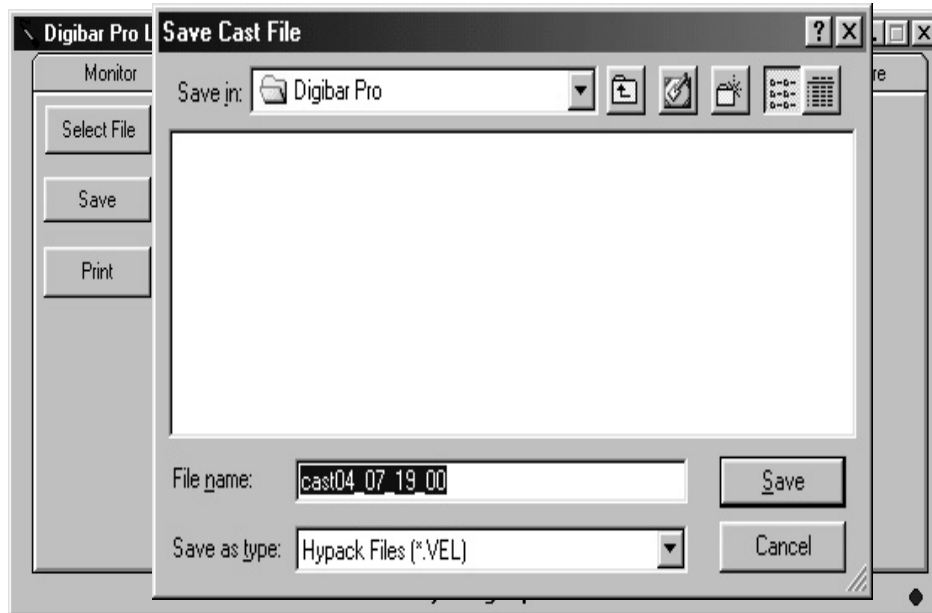




- Click on the **Graph tab**. Observe that the graph of the downloaded data looks appropriate for the cast conditions.



- Click on the **Grid tab**. The grid tab allows the operator to observe and edit the collected data in spreadsheet format. Once the operator is satisfied with the veracity of the data, click the **Save Button**. At this point a windows menu titled "**Save Cast File**" will be displayed. In this window, the operator will be given the opportunity to save the file with a different file name, to determine the destination directory, and to save the file as a different file type (Cast Files (\*.CSV), Hypack Files (\*.VEL), or All Files (\*.\*)). **Important:** In order to save the cast in the format required by Hypack, the operator **must** choose the File Type "**Hypack Files (\*.VEL)**" at this point. Otherwise, Hypack will be unable to read the data. Note: it is also a good idea to save the file into the Coastal/Datum directory (for Hypack Version 8.9).



An interesting observation: *In Hypack applications*, if velocity data is collected in feet/sec., the data will automatically be converted to meters/sec. by Digibar Pro Log once the operator tells the program to save the file as a \*.VEL file (Hypack compatible file). Depths continue to be stored in feet, but all velocities are stored in meters/sec. You can monitor the results of this conversion in the Coastal/Datum directory by selecting Editing, Sound Velocity in Hypack.

### Digibar File Transfer Protocol

Downloading files in the DigibarPro format (each record includes date, time, velocity and depth, ending with the ".csv" extension) is accomplished in the much the same manner as illustrated in steps 1 through 11 above. In Step 11, where the operator is instructed to choose "Hypack Files" the operator should choose the standard spreadsheet compatible (Cast Files (\*.CSV)) file type.

1. Collect a velocity profile (either one-way surface to maximum depth, or round-trip) in the same measurement units as those used for the survey (feet or meters).
2. Note the cast number and edit the individual samples using the **Review** parameter of the DigibarPro. Delete any obvious bad velocities from the cast. Please note that often the last velocity taken will be at or near the bottom and consequently may be corrupted by bottom sediment in the sampling chamber.
3. Select the **Comm** menu on the DigibarPro control unit and confirm the **Baud Rate** is set to 19.2kbs.
4. Connect the DigibarPro serial cable to an active communications port on the data acquisition PC. **Launch the program DigibarPro Log 2.1.** This program is supplied free of charge with each DigibarPro unit and is available for downloading from our website.
5. On the data acquisition PC, Click on the **Setup tab** in DB Pro Log, and confirm that:
  - a. The appropriate Com port on your PC is displayed (Com 1, com 2, etc.)
  - b. The box next to Com port is checked and no checks are in the boxes next to "direct to probe" or "simulator" buttons.
6. Click on the **Logging tab**. The default file name displayed is cast00.csv. Please note that if the operator chooses to change nothing from the default configuration, then the file to be downloaded (in most cases) will be stored at C:/Program Files/Digibar Pro/cast00.csv. Should the operator choose to change the file name or destination directory, then click the **Browse button** and rename the file with a more descriptive name (perhaps one including the date and time) before proceeding. Making more descriptive file names aids in tracking data from particular casts later on.
7. Click on the box next to the **Begin Cast Download** button and enter the # of the particular cast in the DigibarPro control unit you wish to download (1 thru 10).
8. Click the **Begin Cast Download** button. Note that the status line at the bottom of the Logging tab will show "**Downloading cast # to log file**", followed by "**Download complete**". In addition, the circle in the lower right hand corner of the screen will change colors while data is being transferred.
9. Click on the **Graph tab**. Observe that the graph of the downloaded data looks appropriate for the cast conditions.
10. Click on the **Grid tab**. The grid tab allows the operator to observe and edit the collected data in spreadsheet format. Once the operator is satisfied with the veracity of the data, click the **Save Button**. At this point a windows menu titled "**Save Cast File**" will be displayed. In this window, the operator will again be given the opportunity to save the file with a different file name, to determine the destination directory, and to save the file as a different file type.

Once this step is completed, additional editing or plotting of the sound velocity profile can be accomplished using specialized outside software.

The important fact here is that all of the data from the cast is easily and quickly transferred to a standard PC in a common spreadsheet readable format without the need of hand operations or translation from "scientific units" to depths and velocities. Another method of achieving this without the use of the Digibar Pro Log program is to transfer the data using a standard "Terminal Emulation" program such as ProLog or HyperTerminal.

**Interface Cable Pin Out:**

Cable Part Number 2300-0033-0000

MS3116J10-6P		DE-9S
<u>Pin</u>	<u>Signal</u>	<u>Pin</u>
A	Data Out	2
B	Data In	3
C	Shield	5

## Appendix 2

### Quality Assurance Check

To receive the utmost reliability and accuracy from your Digibar Pro, it is recommended that a quality assurance check be performed periodically. This is a simple task that and will not take long to complete, but will give the user a high level of confidence in the data collected.

You will need a bucket of water, the calibration certificate at the back of your Digibar Pro Operation Manual, a reliable thermometer and the Digibar Pro. The use of a calibrated laboratory thermometer is recommended, but is not necessary. Fill the bucket with fresh water. Choose the water temperature between 4°C and 30°C. Obtain a copy of the Digibar Pro Calibration Certificate.

Immerse the Digibar Pro Sound Velocity Probe in the bucket containing the water of room temperature. Acquire a sound velocity reading. Measure the temperature of the water. Find the temperature on the Digibar Pro Calibration Certificate and read the value under the “RES-VEL” column. Compare the reading to the actual value on the Digibar Pro. It should be within ± 1 meter/sec of the “RES-VAL” on the certificate. It may be necessary to allow the transducer to become acclimated to the different water temperature, so allow two to three minutes for the velocity value to settle. The following is an example of a Digibar Pro Calibration Certificate.

03/01/2002					STANDARD DEL GROSSO H2O					SERIAL# 98XXX				
TEMP	VELOCITY	MEASURED FREQUENCY	RES VEL	OBS-CAL	TEMP	VELOCITY	MEASURED FREQUENCY	RES VEL	OBS-CAL	TEMP	VELOCITY	MEASURED FREQUENCY	RES VEL	OBS-CAL
4.0	1421.62		1421.4		17.5	1474.38		1474.6						
4.5	1423.90		1423.7		18.0	1476.01		1476.2						
5.0	1426.15		1426.0		18.5	1477.62		1477.9						
5.5	1428.38		1428.3		19.0	1479.21		1479.4						
6.0	1430.58		1430.5		19.5	1480.77		1481.0						
6.5	1432.75		1432.7		20.0	1482.32		1482.6						
7.0	1434.90		1434.9		20.5	1483.84		1484.1						
7.5	1437.02		1437.0		21.0	1485.35		1485.6						
8.0	1439.12		1439.1		21.5	1486.83		1487.0						
8.5	1441.19		1441.2		22.0	1488.29		1488.5						
9.0	1443.23		1443.2		22.5	1489.74		1490.0						
9.5	1445.25		1445.3		23.0	1491.16		1491.4						
10.0	1447.25		1447.3		23.5	1492.56		1492.7						
10.5	1449.22		1449.3		24.0	1493.95		1494.1						
11.0	1451.17		1451.3		24.5	1495.32		1495.4						
11.5	1453.09		1453.2		25.0	1496.66		1496.8						
12.0	1454.99		1455.1		25.5	1497.99		1498.1						
12.5	1456.87		1457.0		26.0	1499.30		1499.3						
13.0	1458.72		1458.9		26.5	1500.59		1500.6						
13.5	1460.55		1460.7		27.0	1501.86		1501.8						
14.0	1462.36		1462.6		27.5	1503.11		1503.1						
14.5	1464.14		1464.3		28.0	1504.35		1504.2						
15.0	1465.91		1466.1		28.5	1505.56		1505.4						
15.5	1467.65		1467.9		29.0	1506.76		1506.6						
16.0	1469.36		1469.6		29.5	1507.94		1507.8						
16.5	1471.06		1471.3		30.0	1509.10		1508.9						
17.0	1472.73		1472.9											

