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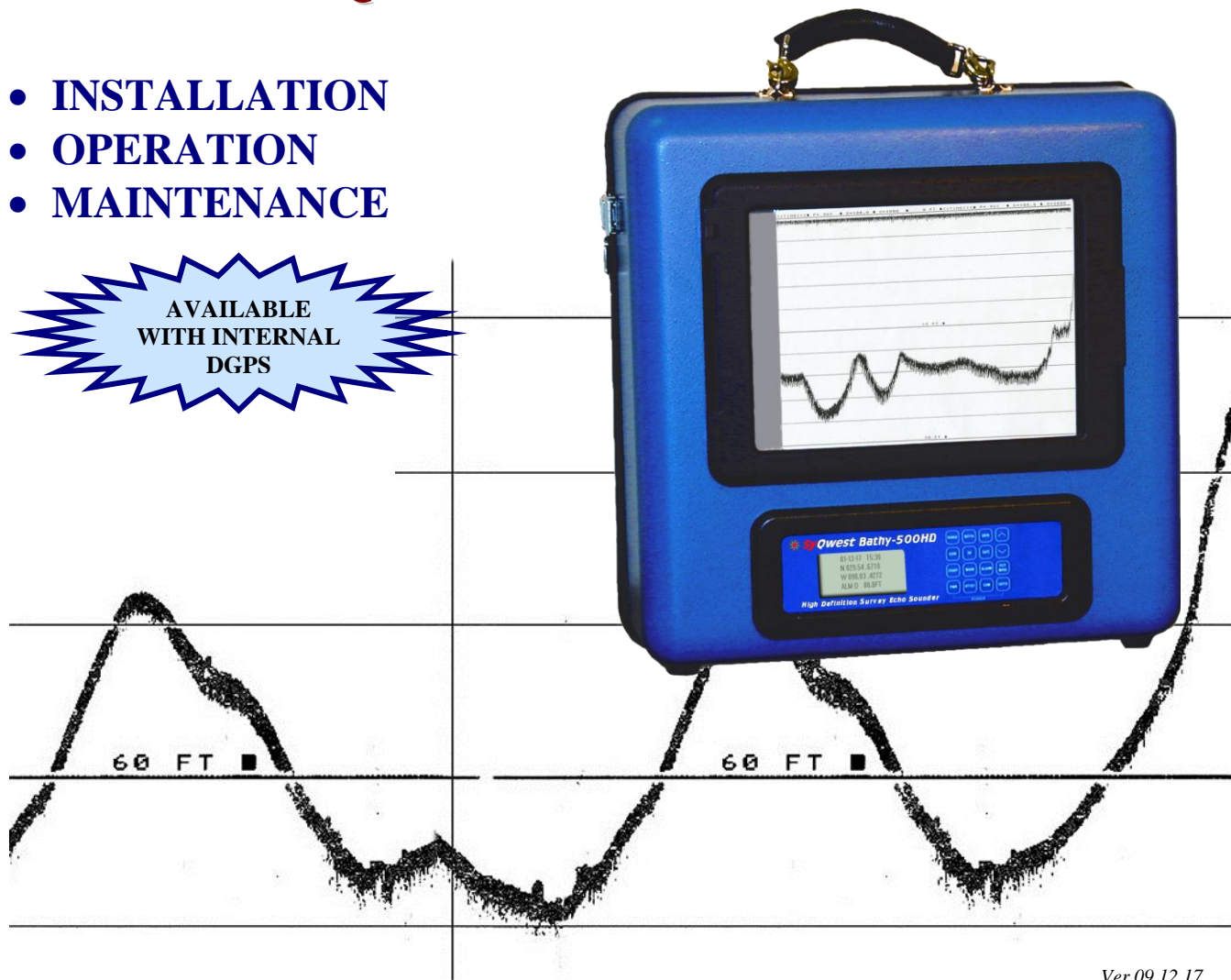
High Resolution Echo Sounders and Acoustic Systems
for Precision Seafloor Exploration

BATHY-500HD

SINGLE FREQUENCY SURVEY ECHO SOUNDER

- INSTALLATION
- OPERATION
- MAINTENANCE

AVAILABLE
WITH INTERNAL
DGPS



Ver 09.12.17



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1.0 - INTRODUCTION

1.1 GENERAL INFORMATION

The Bathy-500HD Survey Echo Sounder provides a high-contrast thermal chart record complete with alphanumeric annotation of important parameters such as geographic position, depth, speed of sound and offset for draft/tide. Real-time viewing of all parameters is provided to the user via front panel liquid-crystal display. Position input can be from either a standard C/A GPS receiver or differential GPS system. Depth data is available to external devices in digital form, via a versatile interface, whose format is selectable by the user using the front panel keypad. The user may obtain digital depth data output, in various industry standard RS-232 formats or NMEA-0183. The ability to accept external annotation input from various PC-based hydrographic software is standard in the Bathy-500HD.

Unit set-up and parameter changes are accomplished via the keypad. Important parameter values are retained by the unit in non-volatile memory when power is removed. A real-time internal clock provides time and date stamping of the chart record.

The Bathy-500HD is equally well suited for both applications which involve rapid depth of channel determination by viewing the chart record and for detailed hydrographic surveys whereby automatic operation and unattended logging of digital depth data is desired. The use of embedded parallel microprocessor architecture allows for operation of the chart recording function simultaneously with digital display and data outputs, while further having the real-time capability to implement a proven weighted bottom detection technique, adaptive bottom tracking gate and other advanced signal processing.

Entirely portable, the Bathy-500HD can be operated on any vessel of opportunity since a wide range of A.C. and D.C. input voltages can be used. Your Bathy-500HD is capable of operation on various frequencies as selected by the user; See Section 3.3.1 for frequency selection procedure. Space is provided in the rear of the unit to store the various transducer types. Since scale annotation is printed on the chart along with bottom features, only one type of chart paper is required; The user need not change paper type when changing measurement units from feet to meters or vice-versa.

1.2 ECHO SOUNDING OVERVIEW

Echo sounding measures water depth by measuring the time interval required for ultrasonic sound waves to travel, at a known velocity, from a known point (a vessel) to a reflecting surface (water bottom) and return. If the time is measured between the transmission of a sound wave and the reception of its echo, the depth may be determined by multiplying one-half of this time interval by the velocity of sound in the water column.

For accurate surveying, sound velocity (more correctly referred to as speed of sound since it is really a scalar value) must be determined and entered into the echo sounder. Sound speed in water is dependent upon the salinity, temperature and depth. For instruments that operate in shallow depths, as is the case for the Bathy-500HD, depth is not a major factor effecting sound speed, so such is not considered in this manual. Complete details regarding the various methods available to the user to measure or estimate sound speed is included in the chapter which describes unit operation (Section 3.0).

Under optimal desired survey conditions, only a single trace will be shown in the water column; That, of course, representing the water bottom. Various conditions do however exist which result in other marks between the zero line and obvious water bottom. Physical conditions such as a rapid temperature gradient (thermocline) or density variation (pycnocline) can form an acoustically reflective layer between the zero mark and true bottom. Further, dense biological material (plankton) may have the same effect. While the user may, in many cases, easily recognize these layers (as represented on the paper chart), automatic digital depth tracking, display and output may be effected. In such cases, a blanking feature (manual gate feature on the Bathy-500HD) is required for robust, reliable unattended surveying.

1.3 SPECIFICATIONS

Depth Ranges:	Units of 0-15, 0 - 30, 0 - 60, 0 - 120, 0 - 240, 0 – 480 Feet or 0-5, 0 - 10, 0 - 20, 0 - 40, 0 - 80, 0 – 160 Meters
Phasing	0-120, 60-180, 120-140, 180-300, 240-360, 300-420, 360- 480 , Auto or 0-40, 20-60, 40-80, 60-100, 80-120, 100-140, 120-160 Meters, Auto
Chart Record:	8.5 inch X 90 Feet (21.59cm x 27.43mt) High-Contrast Thermal Paper
Digital Display:	LCD (4 lines X 16 characters) 0.25 inch (6.35mm) characters (Depth Display 0.75 inch (19.05mm) characters) (Backlighting: Electro-luminescent)
Depth alarms:	Shallow & Deep (selected by keypad)
Speed of Sound:	4600 - 5250 feet/second (1400 - 1600 meters/second) (user selected via keypad or default to 4800 feet/second)
Offset	0 to +30 feet or meters (allows the user, via keypad, to adjust for net sum of transducer depth and tide)
Geographic Position:	NMEA-0183 Format GGA or GLL Format from GPS/DGPS
Data I/O Compatability	COM 1 provides bi-directional interface to PC or other peripheral device; This port accepts external annotation from external sources such as hydrographic software. This port also allows remote control of all echo sounder functions using SyQwest's Windows 95/98/NT based software. COM 2 accepts GPS/DGPS inputs and provides additional (from COM1) data outputs.
Data Output:	A) NMEA-0183 Format (GGA or GLL) B) RS-232/422 Depth (only) ODEC PMC dt (true depth & status) Atlas DESO 25 ODOM Digitrace ODOM Echotrac NMEA dbt NMEA dbs
Acoustic Output	Any single frequency (selected at time of purchase) from these: 33kHz, 50kHz, 200kHz (@600watts maximum)
<i>(specifications continued)</i>	
Input Power:	11-30 volts D.C. (1.5 amps @ 12 v. 0.5 amp @ 30 v.) or 115/230 volts A.C. 50/60 hertz (20 watts)
Dimensions (Recorder)	Height (including handle) 19 inches (48.26cm) Width 17.5 inches (44.45 cm) Depth 9 inches (22.86 cm)
Weight	36 lbs.(15.87 kg) (plus transducer)

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2.0 - INSTALLATION**2.1 OVERVIEW**

Presented in this section are Bathy-500HD physical and electrical details needed to utilize the product in either portable or fixed (installed aboard a vessel) mode. The equipment group shown below must be supplemented with an optional SYQWEST transducer as listed in section 2.4 or SYQWEST approved equal.

2.2 EQUIPMENT SUPPLIED

<u>SYQWEST Part Number</u>	<u>Description</u>	<u>Qty.</u>
P01500	Bathy-500HD Multi Frequency Unit	1
P01182	D.C. Power Cable	1
P01183	A.C. Power Cable	1
P01044	Data I/O Plug Kit	1
P01184	D.C. Fuse (spare) 5 amp, 250 V., 3AG	3
P01185	A.C. Fuse (spare) 0.5 amp, 250v.	3
P01200	Chart Paper Roll Kit (with take up roll)	2
P01504MF	Manual, Operators	1

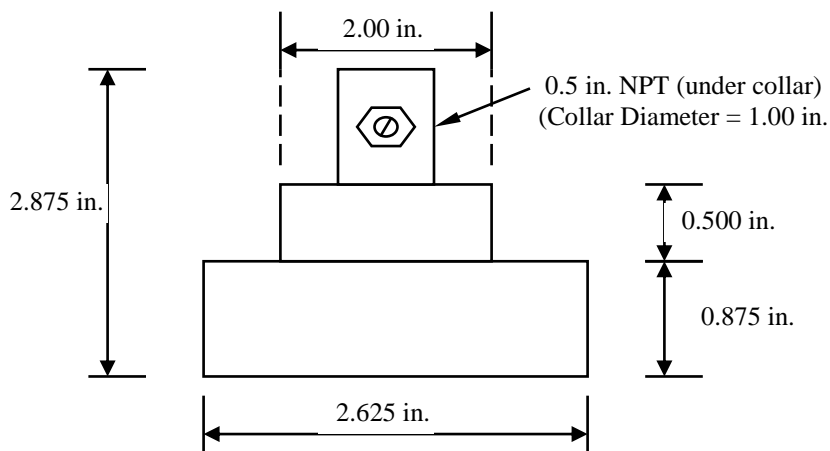
(See section 2.4 for optional transducers)

2.3 ACCESSORIES & OPTIONS

SYQWEST Part Number Description

P03050	Integral DGPS Option
P01170	Handheld Remote Fix Mark Switch (with 15 ft. cable)

2.4 TRANSDUCERS (DIMENSIONS & MOUNTING)



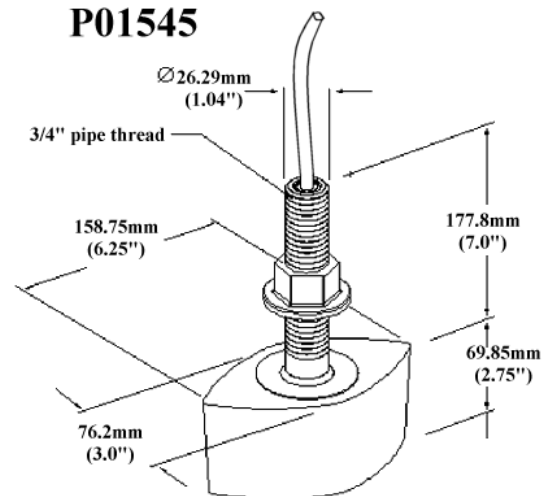
P/N P01540 TRANSDUCER



Resonant Frequency:	208 Khz.
Nominal Impedance:	50 ohms
Beamwidth (@ 3 dB point):	8 degrees
Cable:	30 feet (with plug to mate with recorder)
Housing Material:	Brass (with urethane acoustic window)
Piezo Material:	Barium Titanate

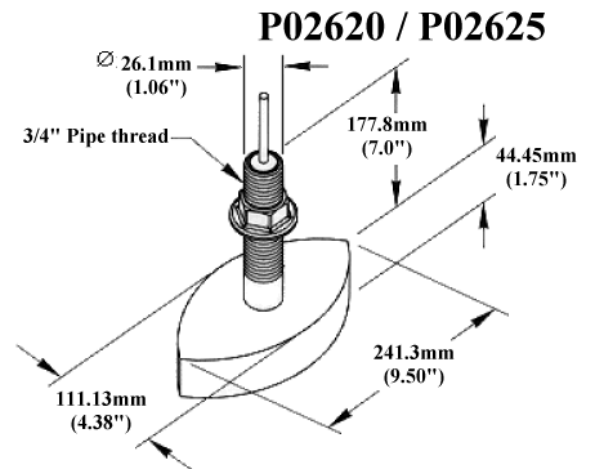
P/N P01545 TRANSDUCER

Resonant Frequency: 40 Khz.
 Nominal Impedance: 150 ohms
 Beamwidth (@ 3 dB point): 36 degrees
 Cable: 30 feet (with plug to mate with recorder)
 Housing Material: Brass (with urethane acoustic window)
 Piezo Material: Barium Titanate



P/N P02620 TRANSDUCER

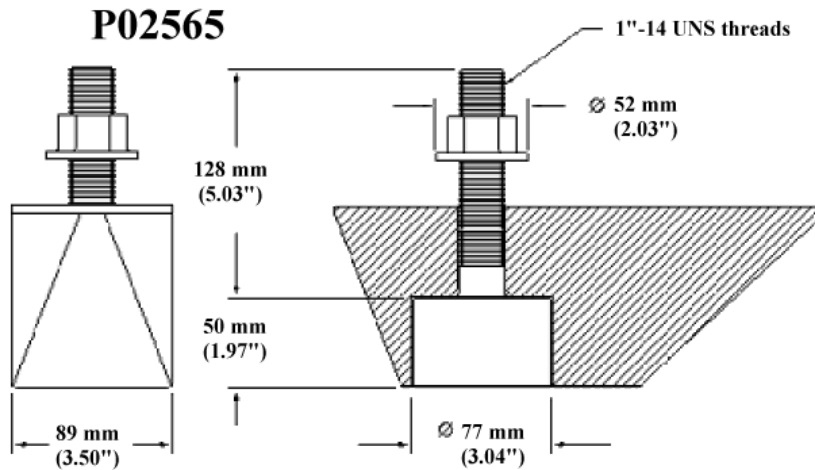
Resonant Frequency: 50 Khz.
 Nominal Impedance: 150 ohms
 Beamwidth (@ 3 dB point): 18 degrees
 Cable: 30 feet (with plug to mate with recorder)
 Housing Material: Brass (with urethane acoustic window)
 Piezo Material: Barium Titanate



P/N P02625 TRANSDUCER

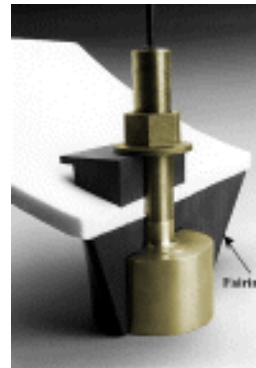
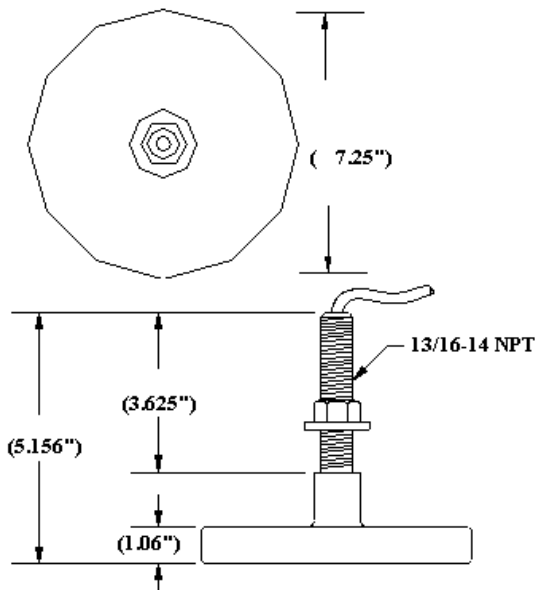


Resonant Frequency: 200 Khz & 50 Khz.
 Nominal Impedance: 150 ohms
 Beamwidth (@ 3 dB point): 9 degree & 14 degree
 Cable: 30 feet (with plugs to mate with recorder)
 Housing Material: Brass (with urethane acoustic window)
 Piezo Material: Barium Titanate



P/N P02565 TRANSDUCER

Resonant Frequency: 200 KHz
 Nominal Impedance: 100 ohms
 Beamwidth (@ 3 dB point): 6 degree
 Cable: 30 feet (with plug to mate with recorder)
 Housing Material: Brass (with urethane acoustic window)

**P02560**

P/N P02560 TRANSDUCER

Resonant Frequency: 210 KHz
 Nominal Impedance: 60 ohms
 Beamwidth (@ 3 dB point): 3 degree
 Cable: 30 feet (with plug to mate with recorder)
 Housing Material: Brass (with urethane acoustic window)
 Piezo Material: Barium Titanate

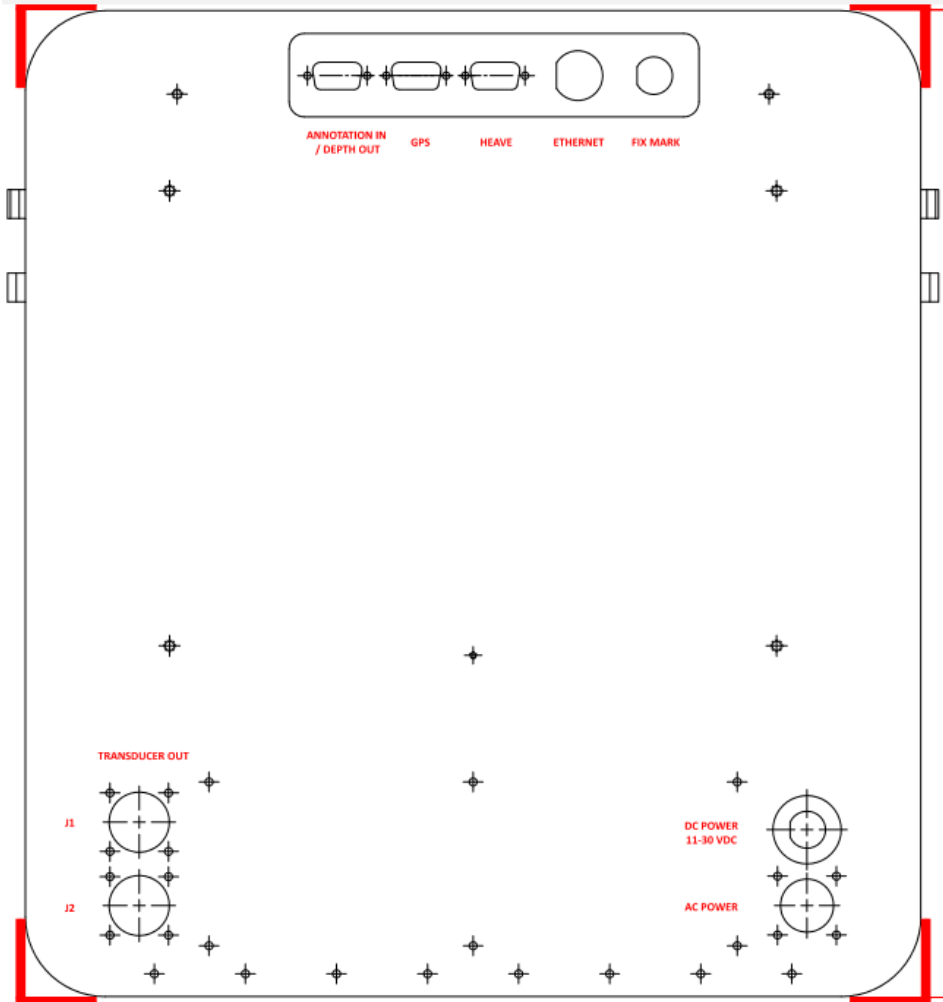


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2.5 Basic Connections

All electrical connections to the Bathy-500HD are via quick-disconnect plugs, which attach to the rear of the center plate of the unit as shown below. Plugs are factory installed thus the user need not be concerned with details of the connector pin-outs unless field repair of cables or plugs is required; To aid in such cases, pin-out data is given in the following sections Information related to using the Data I/O connector ports is given in section 2.6.



2.5.1 A.C. Power Input (& voltage selection)

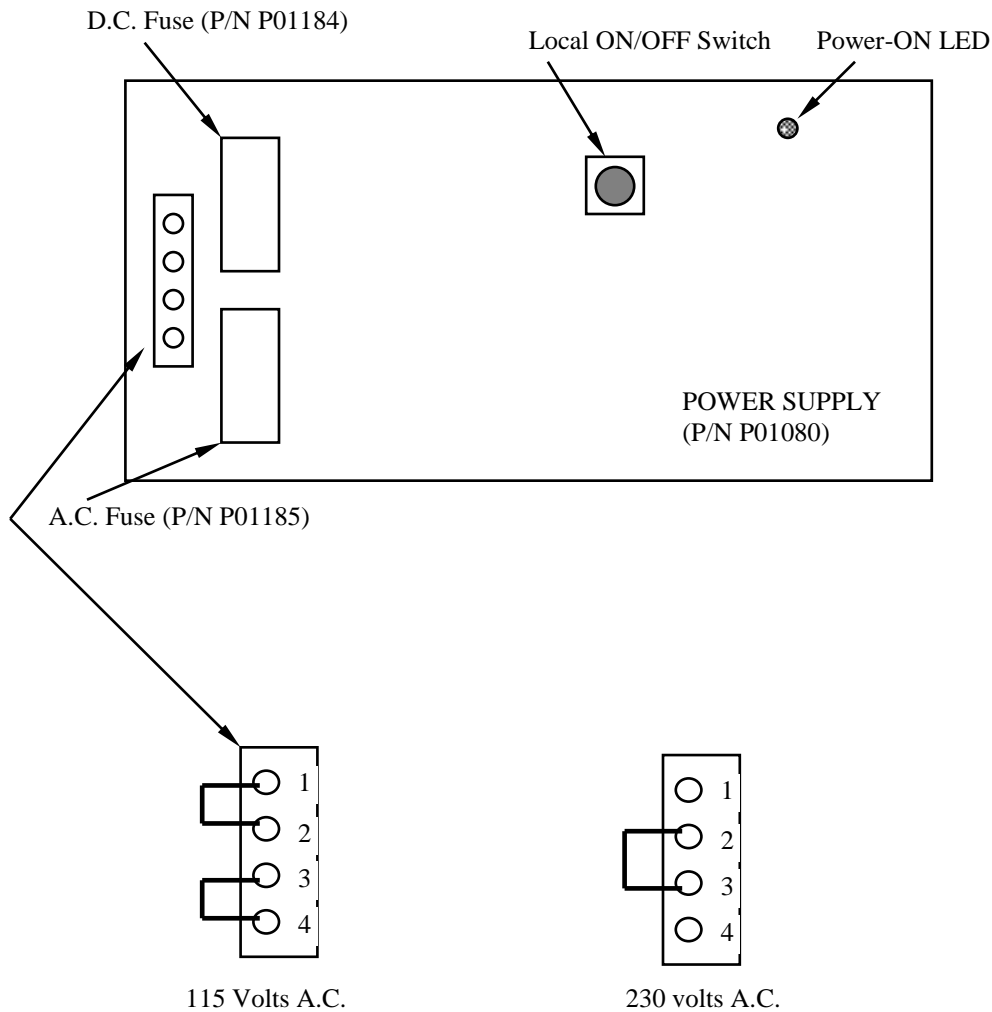
Before applying A.C. power to the unit, the user must insure that the Bathy-500HD recorder has been properly configured with regard to A.C. voltage (115 or 230). Jumpers on the left side of the P/N P01080 Power Supply PCB must be reconfigured as shown below. For safety reasons the A.C. Power cable must not be placed into the center plate connector when jumpers are removed or installed. At all times that the protective plastic cover is removed from the unit the power cable should be unplugged.

NOTE: Bathy-500HD units are shipped from the factory configured for 115 volts A.C.

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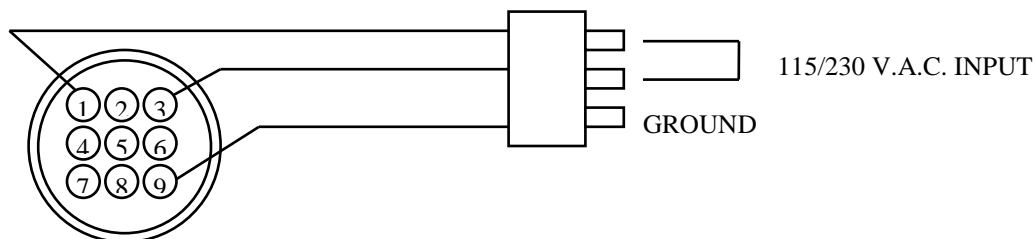
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JUMPER FORMAT FOR A.C. VOLTAGES

Shown above, in addition to voltage setting information is the local ON/OFF switch and power ON LED. Details on these items are described in section 4.0 (maintenance).

Should it become necessary to add additional cable or to repair the P/N P01183 A.C. Power Cable, the user should refer to the plug diagram below.



VIEW SHOWN IS PLUG FROM REAR (WIRE SIDE)

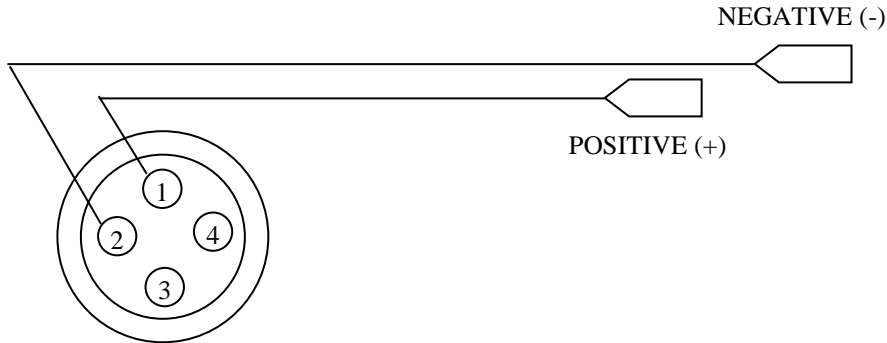
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2.5.2 D.C. Power Input

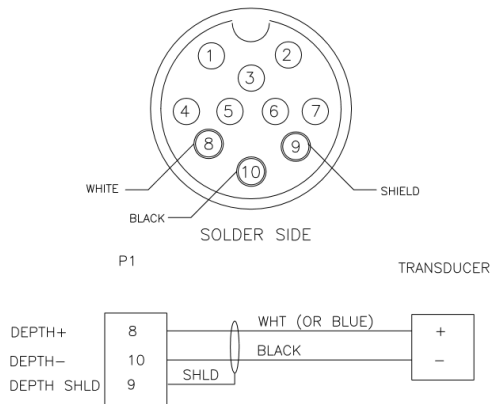
If the user desires to operate the Bathy-500HD from a D.C. source any battery supply in the range of 11 to 30 volts may be used. No selection of the input voltage need be done as the power supply or the unit will regulate automatically over the stated voltage range. The user need only connect the P/N P01182 D.C. Power Cable Color-coded battery clips (red = positive +) are factory installed on this cable assembly. If cable replacement is required refer to the diagram below.



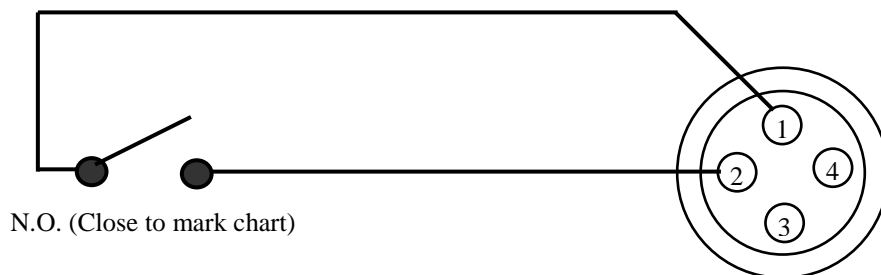
VIEW SHOWN IS PLUG FROM REAR (WIRE SIDE)

2.5.3 Transducer Plug

The transducer plug for the Bathy-500HD, as pre-wired from the factory, is shown below.



2.5.4 Fix Mark (remote)



VIEW SHOWN IS PLUG FROM REAR (WIRE SIDE)

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2.6 DATA I/O INTERFACING

Data input (geographic position or external annotation) and parameter outputs interface thru the Data I/O connector on the rear of the center plate. The following sub-sections provide the systems integrator with all data required to utilize the Bathy-500HD as an integral building block of his hydrographic survey system.

2.6.1 Connector Pin-out & Data I/O Set-up

The three data ports are accessed on the rear of the center plate using an industry standard DB-9 plug. Pin designations are shown below.

GPS

2	---GPS TX
3	---GPS RX
5	---Ground

HEAVE

2	---HEAVE TX
3	---HEAVE RX
5	---Ground

ANNOTATION/DEPTH OUT

Annotation and depth out is used with survey applications, running on Host PC. This connection requires a straight through 1 to 1 9 pin serial cable.

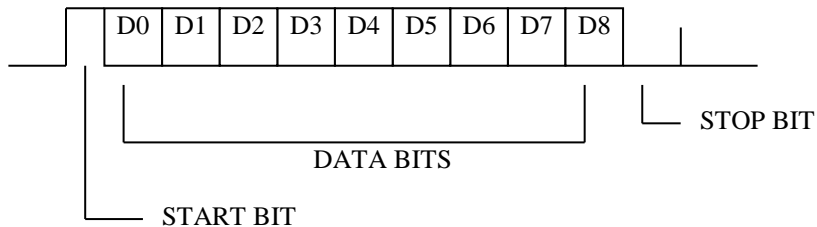
2	---DEPTH TX
3	---ANNO RX
5	---Ground

2.6.2 Data Input

2.6.2.1 GPS Input

Your Bathy-500HD will accept NMEA 0183 input sentences containing GPS position in either GGA or GLL format. The unit auto detects when GGA is present in a sentence and accepts such as its first choice of position. Input position and unit time/date can be annotated on the chart record. The unit will accept input data in RS-232 input levels as denoted in section 2.6.1

The standard NMEA 0183 data transmission format is as follows; Data is transmitted in serial asynchronous form in accordance with ANSI standards. The First bit is a start bit and is followed by data bits, least-significant-bit first as illustrated below. The following parameters are used: Baud rate = 4800/9600/19200/38400/57600, Data bits = 8 (d7 = 0), Parity = None, Stop bits = One.



2.6.2.2 External Annotation Input

In lieu of GPS position your Bathy-500HD will accept external annotation from various PC-based hydrographic software; Up to forty-four characters (Alphanumeric-uppercase) may be printed vertically. Serial input is made to the same hardware pins as is used for GPS input; See Section 2.6.1.

To start an annotation string, "CONTROL F" then "CONTROL A" is inputted; This is followed by up to forty-four characters, then "CONTROL D" to end the string. Simply put, the sequence is shown below.

(CNTRL F) (CNTRL A) (ANNOTATION) (CNTRL D)

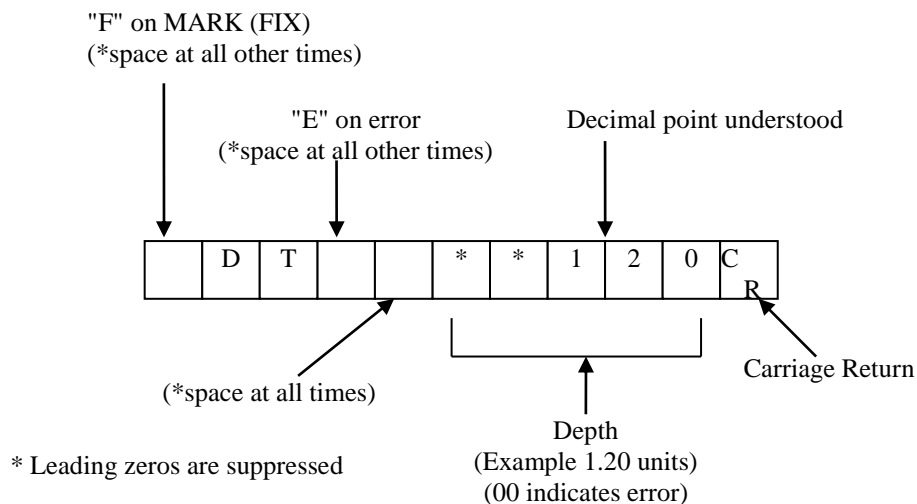
Should the user not desire vertical annotation but instead desire a vertical fix mark line, only a (CNTRL F) need be sent from the PC.

2.6.3 Data Outputs

Section 2.6.3 lists the various data output formats available from the Data I/O at the Bathy-500HD. This section provides more detailed, information for each format (sentence) to allow the user to interface with external peripheral devices Hardware pin-out connections are listed in section 2.6.1.

2.6.3.1 ODOM dt Format

Your Bathy-500HD emulates the digital depth output of the ODOM Digitrace depth digitizer unit. To receive ODOM dt format data, the user will connect his external receiving device to the ANNO connection on the rear center plate. The ODOM standard output data string contains 11 characters as shown below; No parity is used and the sentence has 8 data bits and 1 stop bit.



Byte 1:

An ASCII "F" (hex 46) appears as the first byte in the string whenever the operator depresses the recorder MARK key. The depth value in the output string reflects the depth at the point which the key is pressed. At all other times the ASCII "space" (hex 20) appears at this location.

Byte 2 & 3:

Characters 2 and 3 contain the unit identifiers. These are set to "D" and "T" (hex 44, 54).

Byte 4:

Position 4 is reserved as an error indicator in the form of an ASCII "E" (hex 45) and coincides with all zeros in the depth field. An ASCII "space" is present at all other times.

Byte 5:

This location will always contain the ASCII "space".

Byte 6 thru 10

True depth is given in these five positions with the decimal point understood to be fixed between bytes 8 and 9. Leading zero suppression is applied to the first two digits of depth. For example, for a depth of 8.5 feet, the five digits would appear as: space/space/8/5/0.

Depth in the output sentence will be corrected for Offset and Speed of Sound. In the event of an error due to loss of bottom tracking two zeros will appear in the depth field and the "E" character will occur in byte 4.

Byte 11:

A carriage return <CR> delimiter (hex)D) is always placed at the end of the string.

2.6.3.2 ODOM et Format

This output emulates the ODOM Echotrac output sentence as shown in the example below.

_E T _ _ x x x x <CR>

During normal operation the "space" in front of the "E" will be blank; When a Fix Mark is initiated, this space will contain the character "F". During proper equipment operation, the "space" immediately after the "T" is blank; Should the bottom be lost, an error condition is indicated by the character "E" being placed in this space.

Output in "FEET" units is denoted as "ET" while output in "METERS" is denoted as "et".

"1234" equals 123.4 feet). If in Metric mode, there would be two places after the decimal, thus "1234" equals 12.34 meters. Note that zeroes are suppressed.

2.6.3.3 PMC dt Format

The structure for this industry standard output is shown below.

_D T _ _ x x x . x _FT <CRLF> (English mode)

_D T _ _ x x . x x _MT <CRLF> (Metric mode)

During normal operation the "space" in front of the "D" will be blank; An "E" in this space indicates an error such as lost bottom while an "F" indicates a Fix Mark.

2.6.3.4 NMEA dbt

Data output will be NMEA 0183 depth below transducer sentence format as shown below.

\$ S D D B T , x x x . x , f , x x x . x x , M , x x . x , F <CRLF>

Where x x x . x = feet (f) x x x . x x = meters (M) x x . x = fathoms (F)

2.6.3.5 NMEA dbS Format

Data Output will be NMEA 0183 depth below surface sentence format as shown below.

\$ S D D B S , x x x . x , f , x x x . x x , M , x x . x , F <CRLF>

Where x x x . x = feet (f) x x x . x x = meters (M) x x . x = fathoms (F)

2.6.3.6 DESO-25 Format

This data output emulates the output sentence of the Atlas DESO-25.

D A x x x x x . x x Ft * (English mode)

D A x x x x x . x x _m * (Metric mode)

Note that an asterisk is always used as a terminator at the end of the sentence. Also note that in the Metric mode, a blank space will always appear in front of the "m" character.

2.6.3.7 ODEC dpt Format

This data output string is ODEC's comma delimited proprietary format containing Time and Position (from a GPS device), true depth, and depth status. This format is depicted below:

\$ S D O D C , h h : m m : s s , a y y . y y . y y y y , o x x . x x . x x x x , f , x x x x . x , u , v <CR><LF>

Where h h = UTC Hours m m = UTC Minutes s s = UTC Seconds

a = N / S Latitude y y . y y . y y y y = Latitude Degrees, Minutes, Decimal Minutes

o = W / E Longitude x x . x x . x x x x = Longitude Degrees, Minutes, Decimal Minutes

f = Depth Frequency (A = Low Frequency or Only Frequency, B = High Frequency)

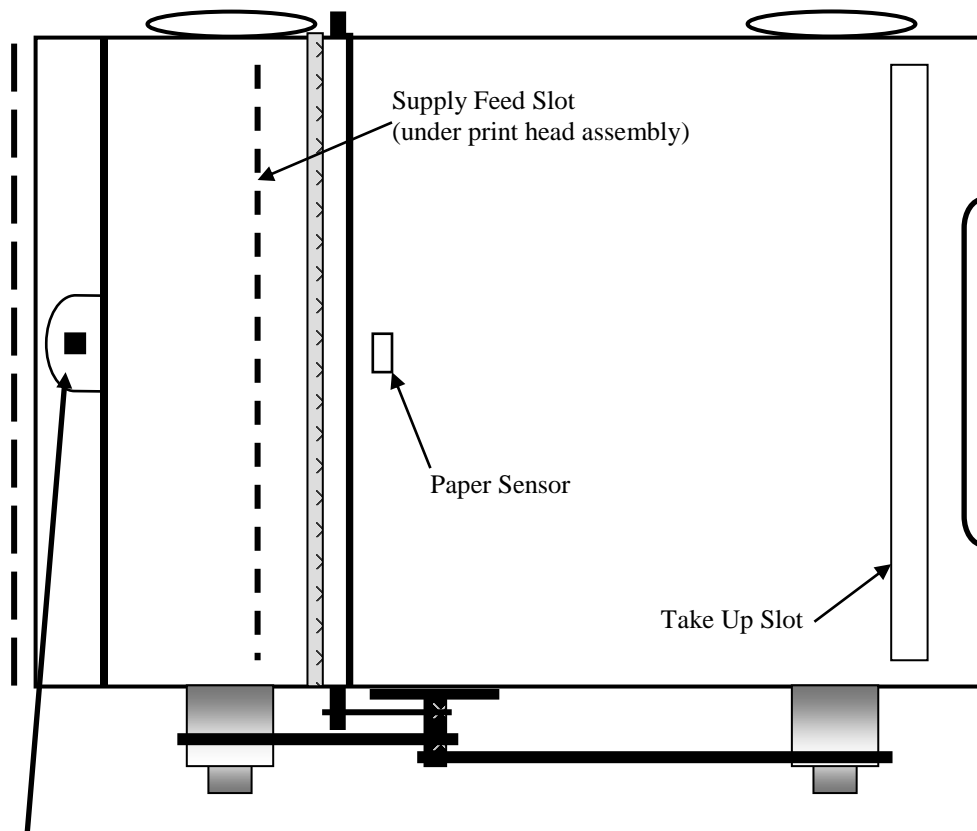
x x x x . x = True Depth u = Units (M = Meters, f = Feet) v = Depth Status (A = Valid, V = Invalid)

2.7 CHART PAPER INSTALLATION

With your Bathy-500HD, two P/N P01200 Chart Paper Roll Kits are supplied. Additional kits are available from SyQwest Incorporated. *Do not use other paper types in your Bathy-500HD. Attempted use of other media will result in improper contrast shading and potential damage to the thin-film printhead. Do not attempt to substitute paper take up rolls as the roll furnished with the kit is designed (size and tolerance) to precisely fit the paper shaft. Use of any paper kit other than that type specified herein will void the thin-film thermal printhead warranty.*

Before beginning installation of a new paper roll, perform the following:

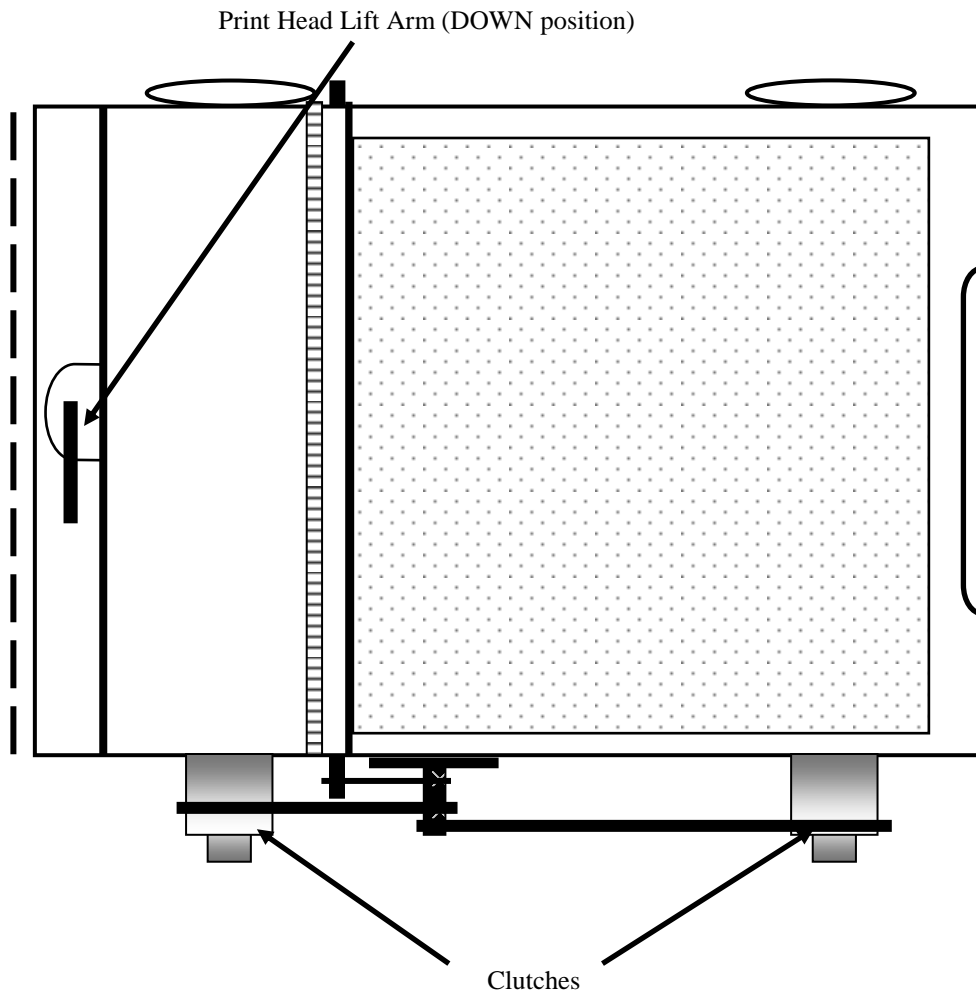
- 1) Remove the empty supply roll liner and full take up roll.
- 2) Clean debris from both paper shafts (under no circumstances add lubricants to shafts).
- 3) Place your print head lift arm in the UP position (as shown in the diagram below).
- 4) Use a dry cloth to clean any debris from the surface of the paper sensor (see below).



Print Head Lift Arm (UP position)

(continuing the paper installation process)

- 5) Install the new paper take up roll onto the take up paper shaft as shown below.
 - 6) Install the new supply roll onto the supply paper shaft and feed the leading edge of the paper over the printhead roller, under the printhead assembly, across the chart module and down to the return slot and to the take up roll.
 - 7) Use the take up clutch spool to adequate paper (for holding) onto the take up roll and to pull the paper taut across the chart module face.
 - 8) Return the printhead lift arm to the down (closed) position (shown below).
- Insure that the paper is aligned with the platen bottom

SPECIAL NOTES:

Your Bathy-500HD contains an optical sensor (located in the platen just in front of the print-head) to halt printing should the paper supply become exhausted or if the paper is incorrectly aligned (buckled); Should the unit stop printing, power down, correct the problem then reapply power. Your Bathy-500HD will not power-up without proper paper supply alignment. Your Bathy-500HD also contains an automatic shutdown in the event of over-temperature; the unit will again function normally upon return to normal operating temperature range and reapplication of power.

Refer to Section 4.4.1 for the proper procedure to clean the printhead.

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2.8 SOFTWARE & ON-BOARD MEMORY

The Bathy-500HD system stores the captured data on an internal 32GB SD Memory card. The systems is able to show the data digitally with the software included with the system.

2.8.1 Software Installation

Place the included CD into the user computer and follow the on-screen prompts. It is recommended to install the following software:

- 1) Bathy-500HD Software “Host Application” , this software is the Windows interface to the Bathy-500HD.
- 2) Filezilla FTP: This is provided to allow file transfer from the Bathy-500HD SD card to your local pc.
- 3) Hyperterminal: This must be “copied” from the CD to your PC, then create a “shortcut” to the exe file.

2.9 Bathy-500HD Host PC Ethernet Interface

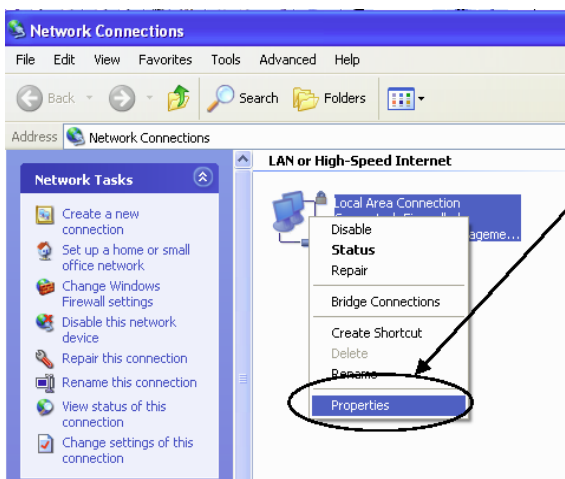
The Bathy-500HD Unit communicates with the Bathy-500HD Windows PC Host Application via a single Ethernet interface connection. It is very important to setup the Ethernet connection properly within the Windows configuration to ensure a reliable connection at all times.

The Windows operating system is designed to permit most connections to be “plug and play” so connecting any hardware device to a Windows PC is simple for the user.

In the case of the Bathy-500HD, the Windows PC is part of a real-time data acquisition system so the LAN configuration for the Bathy-500HD Ethernet setup needs to be setup as a **dedicated TCP/IP connection for optimum system operation.** The sections below detail how to setup the connection properly, with the correct IP Address, and Sub Net Mask.

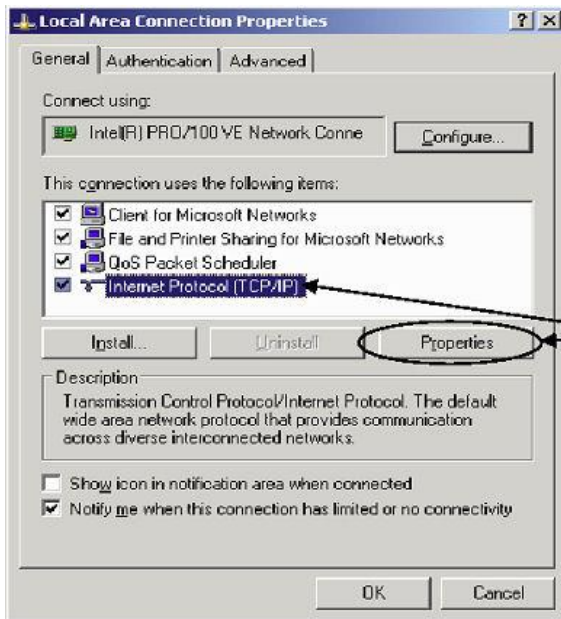
Once the Bathy-500HD setup is complete and the network connection has been established, the user must also evaluate any other network connections that are connected the Bathy-500HD Host PC. The Bathy-500HD system can work with other LAN connections connected to the PC but due to the real time nature of the acoustic data acquisition, heavy loading on another LAN connection can cause issues with the Bathy-500HD sensor to host interface.

2.9.1 Setting a Static IP Address for Network Connection



To set up your computer, follow these steps.
Go to: Start Settings Network Connections

Right click on the “Local Area Connection” icon and select “Properties”
You should see the following, or similar type screen:



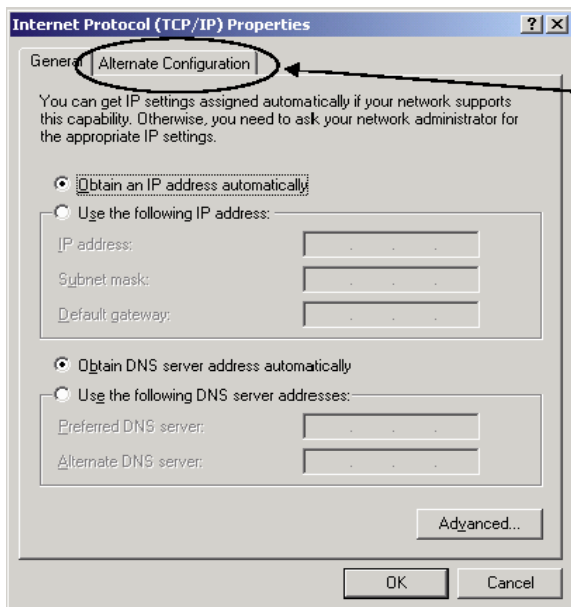
Scroll to and Click on “Internet Protocol” and then on “Properties”

You should see the “Internet Protocol (TCP/IP) Properties” window.

You can either set up the interface under the “General” setup or the “Alternate Configuration” tab.

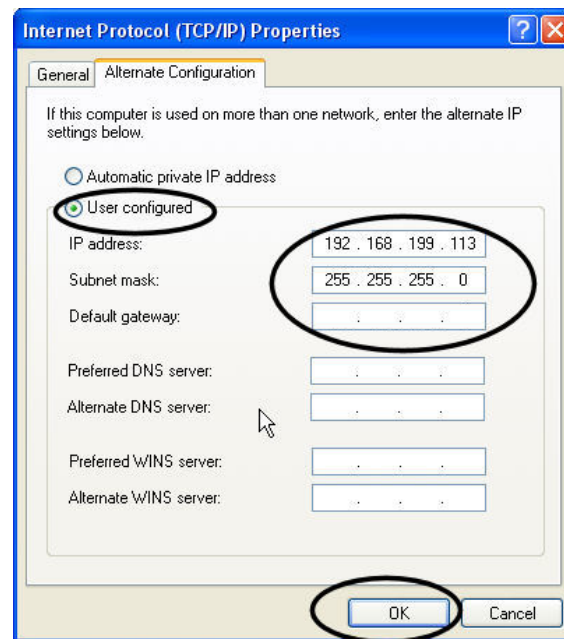
If you have 2 or more Network connections available, you may want to use the “General” settings on your selected Network card.

Click the “Use the following IP address” radio button and set it up with the IP address shown below (the same as shown below under “alternate”). If you already use that connection, or you are limited on your network connections, you can select the alternate tab. When selected it will be displayed with “Automatic private IP address” selected.



Click the “Use the following IP address” radio button
Enter the IP address information shown below
Select “OK”

For use with the Bathy-500HDPC, it is required that you use the 192.168.199.113 address.



If you have only one network connection, and you move the network cable from your standard network connection to the Bathy when collecting data, you may prefer to set up the “alternate configuration” as shown to the left. This will preserve your “main” network settings, and default to these only when plugged into the Bathy.

2.9.2 Setting an Alternate Static IP Address for Network Connection

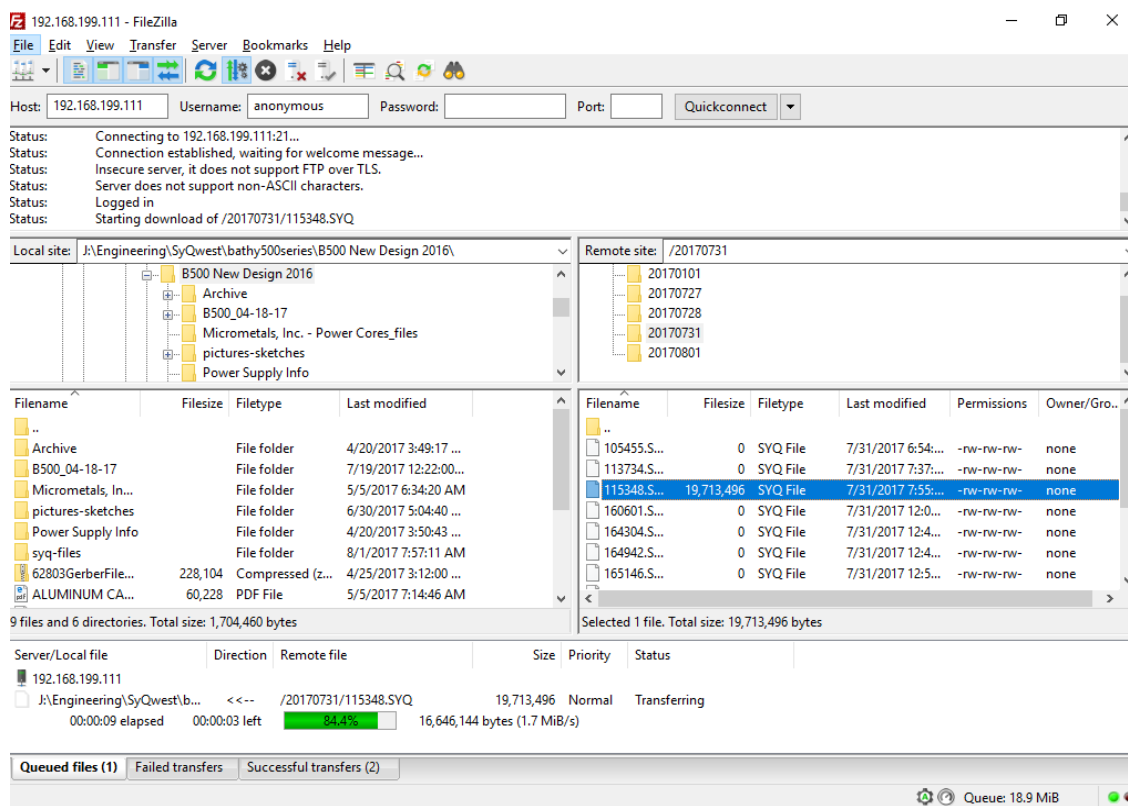
If you move your computer from being connected from a LAN using DHCP to your Bathy-500HDPC or other equipment that uses a static IP address, you can set your computer up to automatically switch to the “alternate” static IP address.
Click on the “Alternate Configuration” Tab and set the IP Address the same as shown above.

The use of the alternate IP address occurs when the computer cannot find a DHCP server such as when it is connected to your Bathy-500HDPC.

2.10 Data Retrieval from Bathy-500HD

Connect a CAT 5/6 ethernet cable from the User computer to the RJ-45 jack on the rear of the center plate on the Bathy-500HD Sensor Unit. To retrieve the data from the on-board memory, install, and open the “FileZilla Client” software that was included on the installation CD. In the Host box in “FileZilla” enter the IP Address 192.168.199.111 as (Shown Below). Click the “Quickconnect” option.

The connection will show the “Local Site” (your pc) and the “Remote site” the Bathy-500HD. The stored data files will appear on the (right side panel) “remote site” window of the FileZilla program. Set the “Local site” to the drive or location you wish to “save” the data files to (using the left side panel). Then “Highlight” the “folder” or “file” you wish to download, right click the “Highlighted item” and select “Download” this will initiate the transfer of the files to the folder location on your computer.

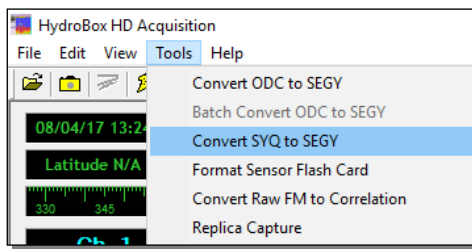


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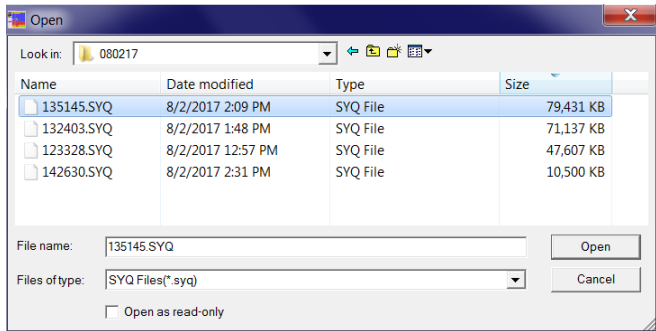
2.10.1 Raw Data Conversion to SEG-Y Data Format



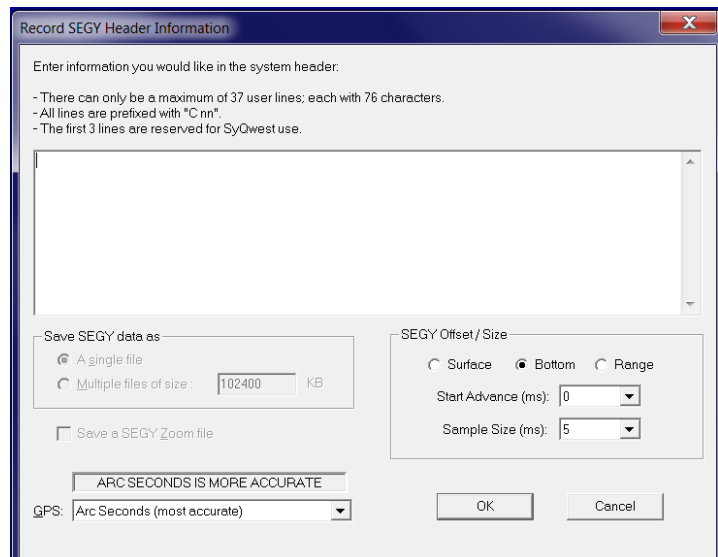
Open the Bathy-500HD software on the Host Computer. Select “Convert SYQ to SEG-Y” located under “tools”.

Open the files that were transferred from the Bathy-500HD to the specified local drive.

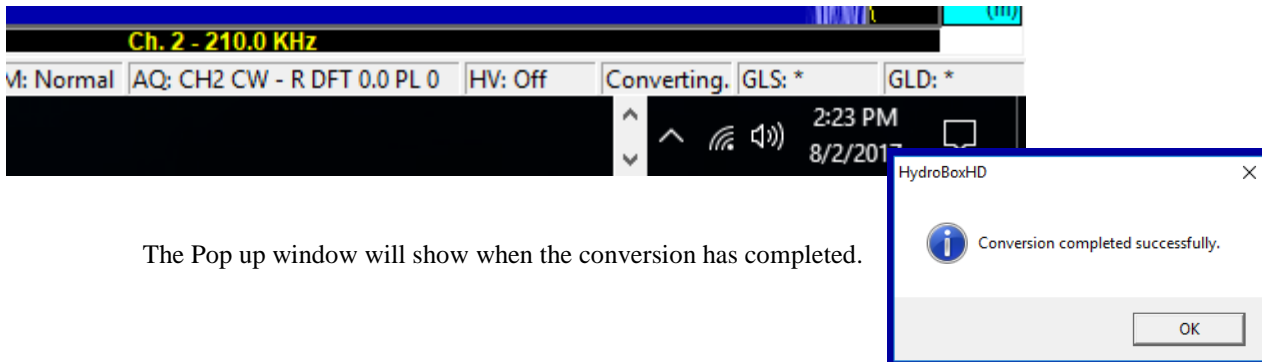
The program will convert the selected file from SYQ format to industry standard SEG-Y format. The new SEG-Y format files will be stored in the same file directory that the SYQ files were placed by the user.



At this point, the SEG-Y Header window will pop up, you may enter any specific information at this time.



During the process, the Bottom Status Bar will display “Converting”.



The Pop up window will show when the conversion has completed.

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2.11 Viewing Digital Playback of Data

After the user has converted the SYQ data to SEGY data, the digital data can be used with the playback function of the Bathy-500HD software. Open the data file by using the “Open for Playback” option located under “File” on the main toolbar. Select the desired SEGY data file from the file directory. The user can control the playback function by using the following buttons located on the toolbar of the Bathy-500HD software.



Playback a Previously Recorded File



Toggle Fast Forward/Normal Playback



Pause Playback



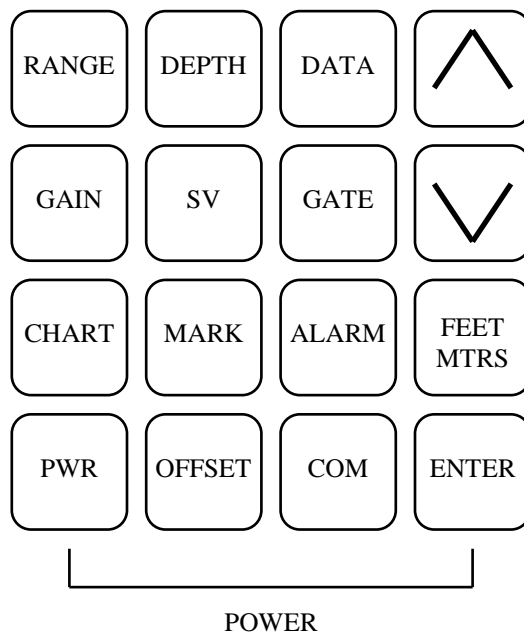
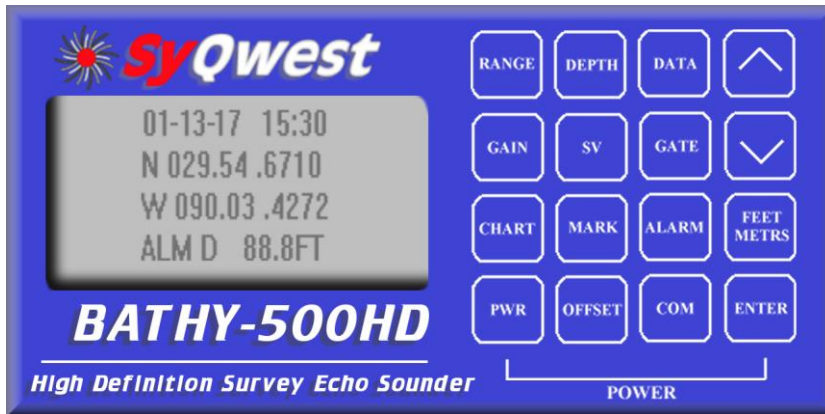
Stop Playback

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3.0 - OPERATION

3.1 THE KEYPAD

Your Bathy-500HD is entirely controlled using the 16 keys which comprise the keypad as shown below.



3.2 ON/OFF

Depressing the PWR and ENTER keys at the same time will turn on your Bathy-500HD: The same procedure is used to turn off the unit

Note: upon powering-down your Bathy-500HD, allow at least five seconds to elapse before powering-up the unit again; This allows time for orderly resetting of the system processor.

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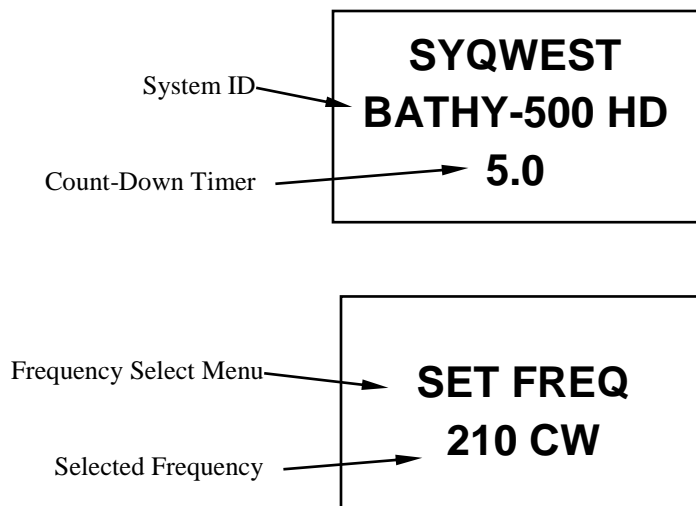
3.3 KEY FUNCTIONS

The following sections denote the detailed function of each key and show the associated display pages for each. No separate descriptive sections are *given* for the ON, ENTER or INCREMENT (up arrow) and DECREMENT (down arrow) keys; Their Functions are denoted in other sections.

3.3.1 CW/FM Mode Selection

Upon powering up your Bathy-500HD, the LCD display will initially show the self-test page (See APPENDIX B); Once this sequence is completed, the below shown page will appear for five seconds. A digital timer (line 3 of the below first page contains the timer status) counts down from 5.0 seconds to 0.0 seconds at which time the Start Up page is displayed. If, however, during the five second count-down, the "COM" key is depressed, the "SET FREQ" menu will appear.

The second example below indicates that your Bathy-500HD has been user programmed for 210Khz operation. If you desire to operate in CW mode, simply depress "ENTER". If not, use the "UP" and "DOWN" arrows to toggle between CW and FM. When the desired mode is shown, depress "ENTER". The Start up Screen will then be displayed.



3.3.2 DATA Key

Depressing the DATA key causes the status display page, as shown below, to be displayed.

Lost echo results
in **ALM E**

01-01-00 00:01
N 029.54.6710
W 090.03.4272
ALM D 88.8 FT

This display page, denoted status display, provides the user with a summary of the important parameters; Date, Time, Position, (if GPS data is present), Depth Alarm (if active) and Depth are shown

Depressing the DATA key a second Time calls up the second page for this key; This page allows the user to set the Time and Date. The second page (to the DATA key) is shown below.

SET TIME & DATE

01-01-00 00:01



To set the month (if the double cursor is below the month designation), use the INCREMT and DECREMENT keys to change the month. To move from month to day (and then year), depress the DATA key as required; Each time using the INCREMENT and DECREMENT keys to change the value. Time is set in the same manner using the DATA key to move the cursor. To accept all values either depress the ENTER key or wait until the unit reverts to the status display page (this will occur after about ten seconds).

3.3.3 DEPTH Key

Depressing the DEPTH key will call up the large format depth screen page as shown below. This display, while being limited to the depth parameter only, provides for readability at extended distance from the unit. (English and Metric shown below)

FEET

88.8

METERS

26.91

3.3.4 FEET/MTRS Key

Depressing this key toggles the chart presentation, digital display and data output between feet and meters.

3.3.5 RANGE Key

The user depresses the RANGE key once to view the range to which the unit is presently set. If the user desires to change the range, INCREMENT and DECREMENT keys are used to step thru the available depth ranges. Shown below is the range display for the maximum range (in feet).

RANGE

480 FT

To accept new (after changing using the INCREMENT and DECREMENT keys), either depress ENTER or wait until the unit reverts to the previous screen.

Depressing the RANGE key a second time calls up the second page of this key, which is phase as shown below.

PHASE

0-480 FT

INCREMENT and DECREMENT keys are used to step thru the various phases; Selection of a new phase is either by depressing the ENTER key or waiting for the unit to revert to the previous page. A listing of the available ranges and phases are shown below.

Range Library:

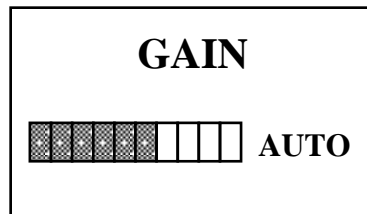
0 - 30 FT.	0 - 10 METERS
0 - 60	0 - 20
0 - 120	0 - 40
0 - 240	0 - 80
0 - 480	0-160

Phase Library:

P1 = 0-120 FT.	0 - 40 METERS
P2 = 60-180	20 - 80
P3 = 120-240	40-80
P4 = 180-300	60-100
P5 = 240 - 360	80 - 120
P6 = 300 - 420	100 - 140
P7 = 360 - 480	120 - 160
AUTO	AUTO

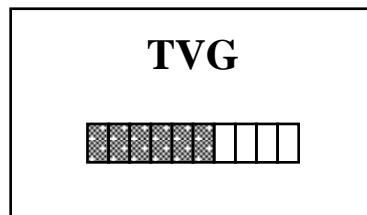
3.3.6 GAIN Key

Depressing the GAIN key once will allow the user to view the previously set gain level. Using the INCREMENT and DECREMENT keys, the user may then change the gain settings as desired and then accept such by depressing the ENTER key. INCREMENT and DECREMENT keys vary the gain in steps of 6db while the display (shown below) is linearized in bar-graph form. The numerical value shown to the right of the bar-graph represents the percent of total gain in use. Incrementing past one-hundred percent sets the unit in auto gain mode.



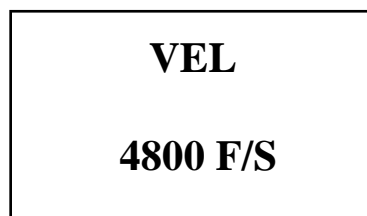
Depressing the GAIN key again will cause the previously set value for time-varied gain (TVG) to be displayed as shown below. TVG can be changed using the INCREMENT and DECREMENT keys.

Once ENTER is depressed the new values are accepted and the unit returns to the previous screen



3.3.7 SV Key (Speed of Sound)

Depressing the SV key will call up the screen page as shown below. This display announces the currently used sound velocity (speed of sound); Display will be in either feet or meters depending upon which scale has been selected by the FEET/MTRS key.



Once the above page is displayed, the user may change the sound velocity using the INCREMENT and DECREMENT keys; This value may be adjusted from 4600 to 5250 feet per second (1400 to 1600 meters per second). Once the desired value is displayed the user depresses ENTER or waits for the unit to revert to the previously viewed page.

The user may determine the sound velocity applicable to a specific survey using three methods:

A) Obtaining the measured sound velocity value from an external sound velocimeter.

B) Performing a "BAR-CHECK" using the Bathy-500HD. To accomplish such, a plate (bar) is placed at a known depth below the transducer face. The user then varies the speed of sound value until that exact depth is displayed on the DEPTH display page (and, of course, the chart). At that point of agreement the entered sound velocity value will be correct for the specific survey area and time. In effect, the Bathy-500HD contains an integral sound velocimeter.

C) By estimating the sound velocity considering the salinity and temperature of the given survey area and time. APPENDIX A provides a matrix of speed of sound values for various combinations of salinity and temperature.

3.3.8 GATE Key

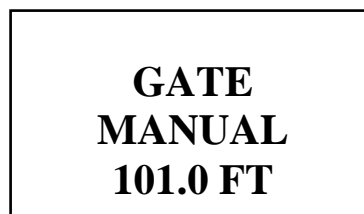
Depressing the GATE key once allows the user to view whether the gate function is disabled (Off), designated to be automatic (Auto) or Manual. Screen pages denoting the first two settings are shown below.



When the gate function is off, the first acoustic return (bottom or other) will be digitized and displayed as depth. In the automatic mode, a self-adaptive gate, based upon real-time mathematical modeling will be established. This mode provides the most robust digital bottom tracking. The user toggles between Off, Auto and Manual screens by pressing the GATE key.

The Manual mode is used when physical or biological conditions cause a "false bottom" in the water column. In such cases, the user may direct the Bathy-500HD to digitize acoustic returns only below that depth.

Once in the Manual mode, the user may change the false bottom blanking depth via the INCREMENT and DECREMENT keys. Depressing ENTER will then accept that value. An example of the Manual mode page is shown below.



3.3.9 CHART Key

Depressing CHART key once will call up the first page of the chart key screens; This page, as shown below, denotes whether the Chart recorder (printing) is enabled or disabled. The user turns the chart printing on or off using the INCREMENT or DECREMENT keys.

**CHART
PRINT
ON**

Depressing the CHART key twice moves to the second screen page of the chart key which denotes whether the chart speed is set to slow or fast. INCREMENT and DECREMENT keys toggle between these two speeds. Slow speed is shown below.

**CHART
SPEED
SLOW**

Depressing the CHART key again moves the display to the third screen as shown below; The user can toggle between chart lamp Off, Lo or Hi via the INCREMENT and DECREMENT keys. Lamp status OFF is shown below.

**CHART
LAMP
OFF**

The fourth CHART key page is obtained by again depressing the CHART key. This allows the user to vary the print contrast of the thermal printer. A typical screen page denoting Lo contrast is shown below: Other settings are Med and Hi.

**CHART
CONTRAST
LO**


The fifth CHART key page is used to reset the paper gauge (% of paper remaining) when the user replaces the chart paper roll. To reset the gauge, the user depresses the INCREMENT or DECREMENT key to remove "No" from the CHART RESET page and replace such with "YES"; Then the ENTER key is pressed.

**CHART
RESET
NO**

The sixth CHART key page controls the number of grid lines to be printed on the chart paper. The user can choose between 10, 20, and 40 grid lines which will divide the chart paper in order to make it more readable. The higher the value, the closer the lines will be to each other.

**CHART
GRID
10**

The seventh CHART key page controls the OnBoard SD Memory card. The user depresses the INCREMENT or DECREMENT key to toggle between on and off. The available amount of unused memory left on the memory card is shown below the option as a bar and percentage amount.

STORAGE OFF
 **XX%**

3.3.10 ALARM Key

Your Bathy-500HD allows the user to set an alarm for both shallow depth and deep depth limits. Upon either alarm condition, the audible alarm will sound and ALM S or ALM D will be shown on the status page (*see* DATA key display).

The user depresses the ALARM key once to view the first screen associated with this key. OFF is shown (as below), all alarms are disabled. To enable, the user presses the ALARM key again and moves on to set to shallow and deep alarm values as shown in further sections on this page.

**ALARM
ON**

The user depresses the ALARM key twice to view the previously selected value for shallow depth. As with other parameters, INCREMENT and DECREMENT keys are used to change this value. A typical display for this screen page is shown below.

**ALARM
SHALLOW
15.0 FT**

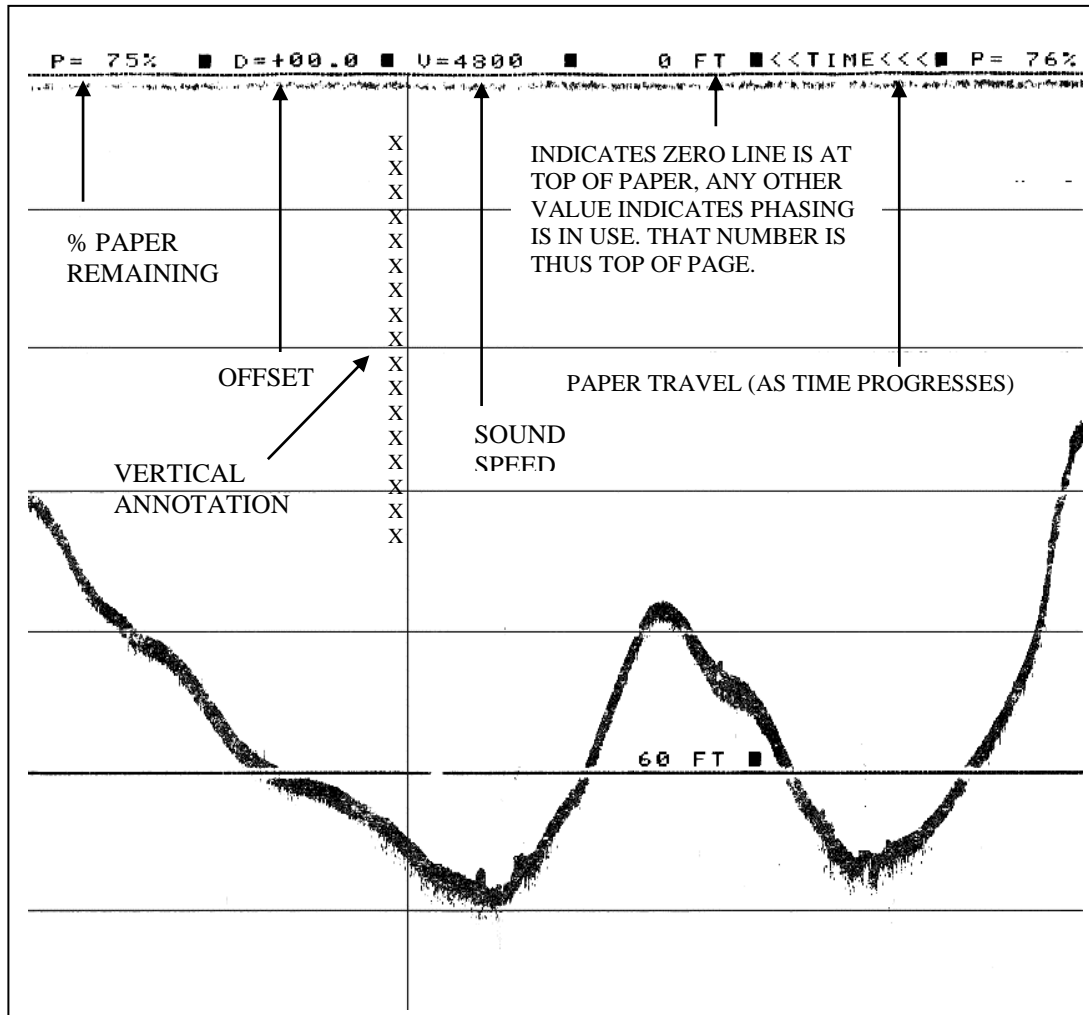
Upon depressing the ALARM key a third time, the deep alarm limit is shown and can be changed in the same manner as the shallow alarm limit. A typical deep alarm screen page is shown below. Press ENTER to accept all values.

**ALARM
DEEP
225.0 FT**

3.3.11 MARK Key

Depressing the MARK key causes a vertical fix (event) line to be printed vertically across the chart; Holding down of this key (3 seconds or greater) will result in the printing of depth, position and other important parameters along the vertical line. The following page contains a sample chart record with such annotation; This vertical annotation is in addition to other annotation routinely printed on the chart record.

Chart Record Example



Note: in automatic gate mode, the actual bottom is shadowed (reduced line intensity) above and below to indicate the gate position and to verify bottom tracking was not lost.

3.3.12 OFFSET Key

This function allows the user to compensate for vessel draft tide etc or for difference in transducer depth and a historical waterline reference. The Offset value shall be the algebraic sum of all components that the user desires to include into a specific survey. A value, from 0 to +30 in tenths of feet may be entered via the INCREMENT and DECREMENT keys and then accepting such by depressing ENTER. Upon the user first depressing the OFFSET key, a screen page of the format shown below will be displayed

OFFSET
120 FT

3.3.13 COM Key

Functions associated with the COM key (communications) allow the user to select various format digital outputs. Upon depressing the COM key, one of the below shown data output formats will be displayed; To change format, use the INCREMENT and DECREMENT keys to toggle between the five types shown; Then press ENTER to accept the output format desired.

COM
FORMAT
ODOM et

Data output will be ODOM et (Echotrac) format. Refer to section 2.6 for details of this format and other formats below.

COM
FORMAT
ODOM dt

Data output will be the ODOM dt (Digitrace) format.

COM
FORMAT
ODEC dpt

Data output will be the **ODEC dpt** format. (ODEC Proprietary string containing time, position, and depth)

**COM
FORMAT
PMC dt**

Data output will be PMC dt format

**COM
FORMAT
NMEA dbs**

Data output will be NMEA dbs (Depth Below Surface) format.

**COM
FORMAT
NMEA dbt**

Data output will be NMEA 0183 dbt (Depth Below Transducer) format.

**COM
FORMAT
DESO 25**

Data output will be DESO 25 (Atlas)) format.

Depressing the COM key a second time will result in the I/O BAUD menu page as shown below. The user may select 4800, 9600, 19200, 38400, or 57600 via the INCREMENT and DECREMENT keys and then depressing the ENTER key. (Note that the baud rate of input data, if any, must match the baud rate of the output data selected).

**COM
I/O BAUD
9600**

**COM
GPS BAUD
9600**

Depressing the COM key a third time will result in the COM GPS BAUD menu page as show below. The user may select 4800, 9600, 19200, 38400, or 57600 via the INCREMENT and DECREMENT keys and then depressing the ENTER key.
(Note that the baud rate of input data, if any, must match the baud rate of the output data selected).

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4.0 - MAINTENANCE

4.1 GENERAL

Your Bathy-500HD consists of individual functional modules as to provide for highest probability of field repair thus reducing survey downtime. No internal adjustments or calibration of the functional modules are required thus the recorder is serviceable by users without extensive knowledge of electronics or special test equipment. Section 4.6 provides a listing of all functional modules, hardware items, and cables which may be needed should your recorder ever fail.

4.2 FUNCTIONAL OVERVIEW

Printed circuit board assemblies (functional modules), along with the thermal printhead assembly and step motor, comprise the key sections of your Bathy-500HD recorder unit. A general technical overview of each printed circuit board containing active electronics follows:

4.2.1 Power Supply

The Bathy-500HD power supply module functions to convert ac line voltage or low-voltage dc, power to regulated 24 volts D.C. to service all other functional modules. Other voltages (i.e. +5v D.C.) required by other modules is generated locally on each such assembly. The B.I.T.E. indicator (green LED) located on the power supply PCB verifies proper operation of this assembly, thus 24 volts D.C. is available to other modules.

4.2.2 Key/Display PCB

The key/display printed circuit board serves to interface the CPU PCB to the liquid-crystal display and keypad. Keystrokes are converted to digital messages to be implemented by the CPU PCB, which collates bi-directional data from the other functional modules and communicates with the user thru the front panel display.

4.3 DIAGNOSTIC CHART*(SEE APPENDIX B FOR SELF-TEST FEATURES)*

SYMPTOM	CHECK & ACTION
Unit does not power-up	1) Check fuses; replace if defective. 2) Use Local On /Off switch on power supply PCB to attempt to power-up unit; If depressing this switch turns unit on, replace the key/display PCB; If not, replace the power supply PCB.
LCD functions; Chart does not	1) If the chart moves (but does not print) replace the printhead. 2) No chart movement Check to insure paper is covering paper sensor (without wrinkles); If so, and still no movement, go to step 3. 3) If the chart does not move, replace the print/drive PCB paper sensor PCB or step motor as applicable
No display or record of depth (other functions are normal)	1) Check transducer connections
No GPS data or depth data output	1) Verify proper operation of external devices.

4.4 CLEANING

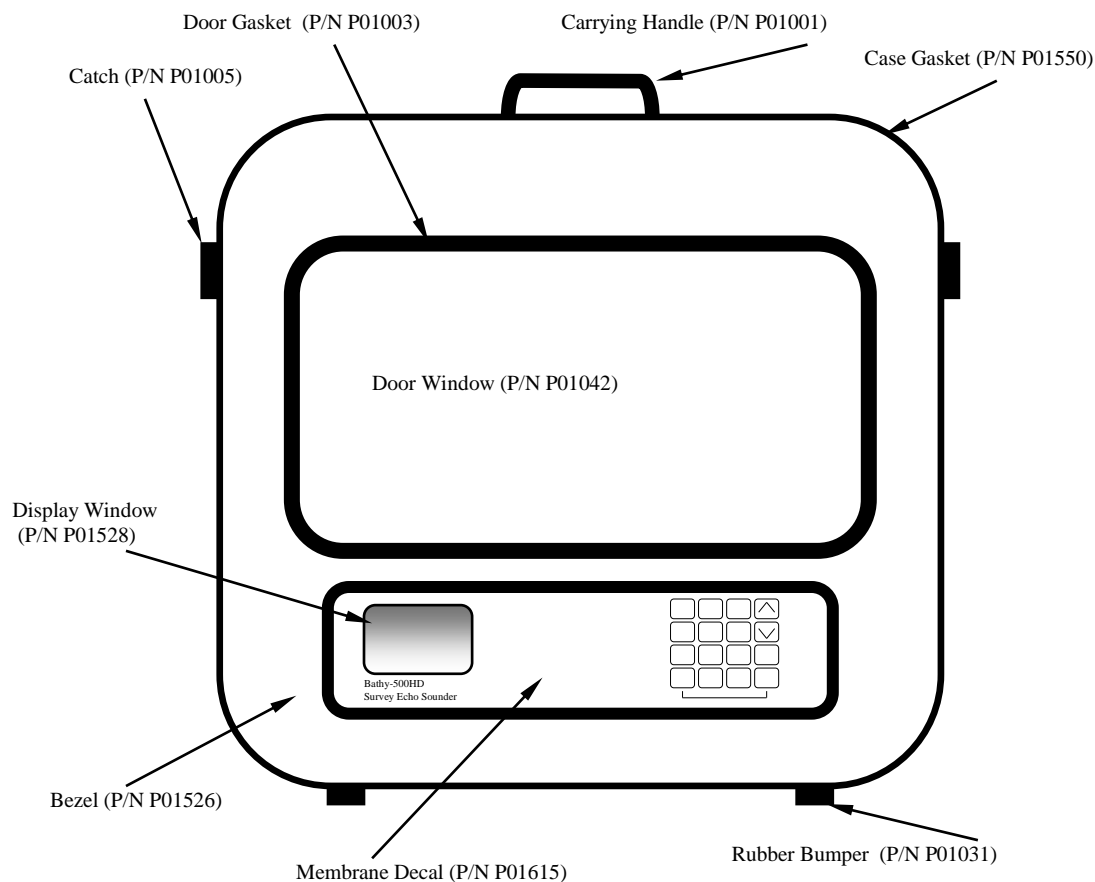
4.4.1 Printhead Care

Your Bathy-500HD utilizes a long-life thin-film thermal printhead. While robust, care must be taken as to not allow sand and other such matter to come in contact with the printhead face. Should the interior of the case become contaminated with any such matter, stop operation at once; Raise the printhead assembly by using the lift arm, remove the paper and use dry air to remove all such particles from around the printhead and chart module paper travel surface. *Never clean the printhead surface with anything except a cotton swab, which has been moistened with Isopropyl alcohol. DO NOT USE ANY OTHER SOLVENT.*

4.4.2 Printhead Roller

It is important to maintain a clean printhead roller to prevent slippage during printing. *Before cleaning the printhead roller, always raise the printhead using the lift arm.* Use a cotton swab to clean the roller. If a solvent is needed, use only isopropyl alcohol. *Do not use any other solvent; the roller is synthetic rubber and will be damaged.*

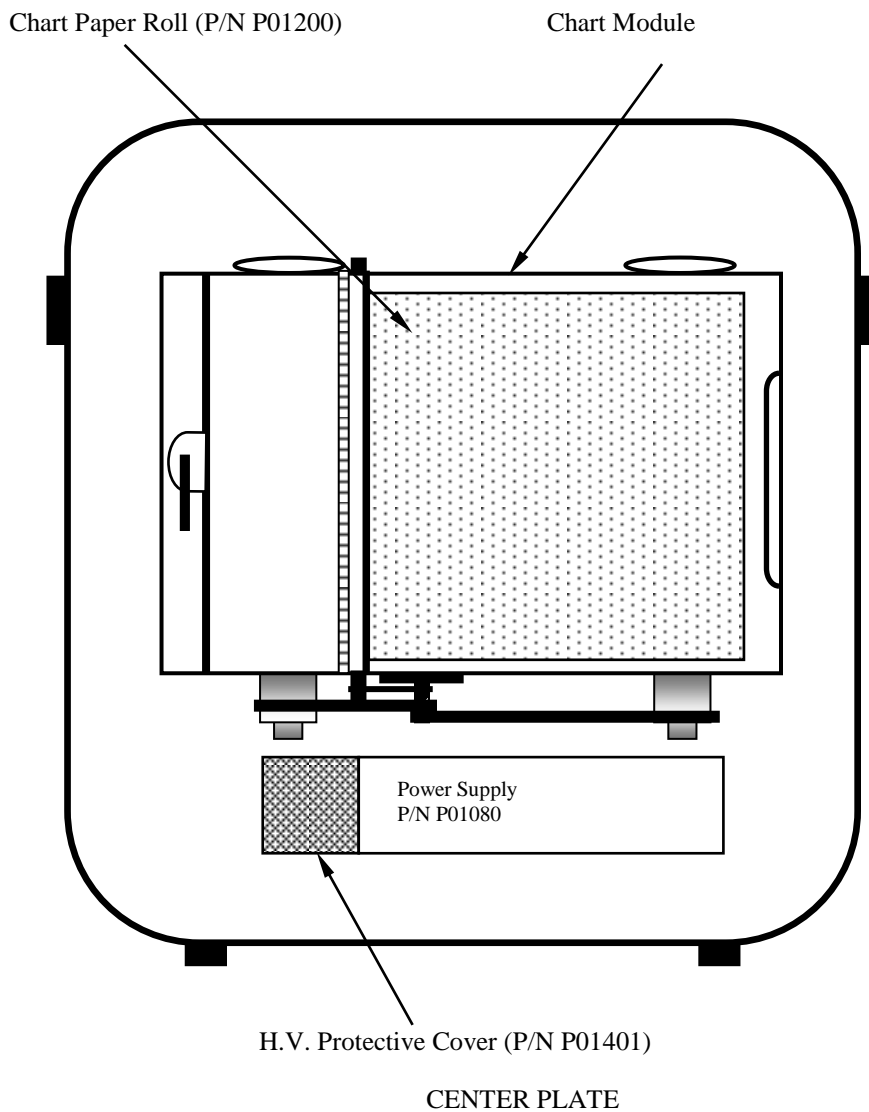
4.5 MECHANICAL REPLACEMENT PARTS



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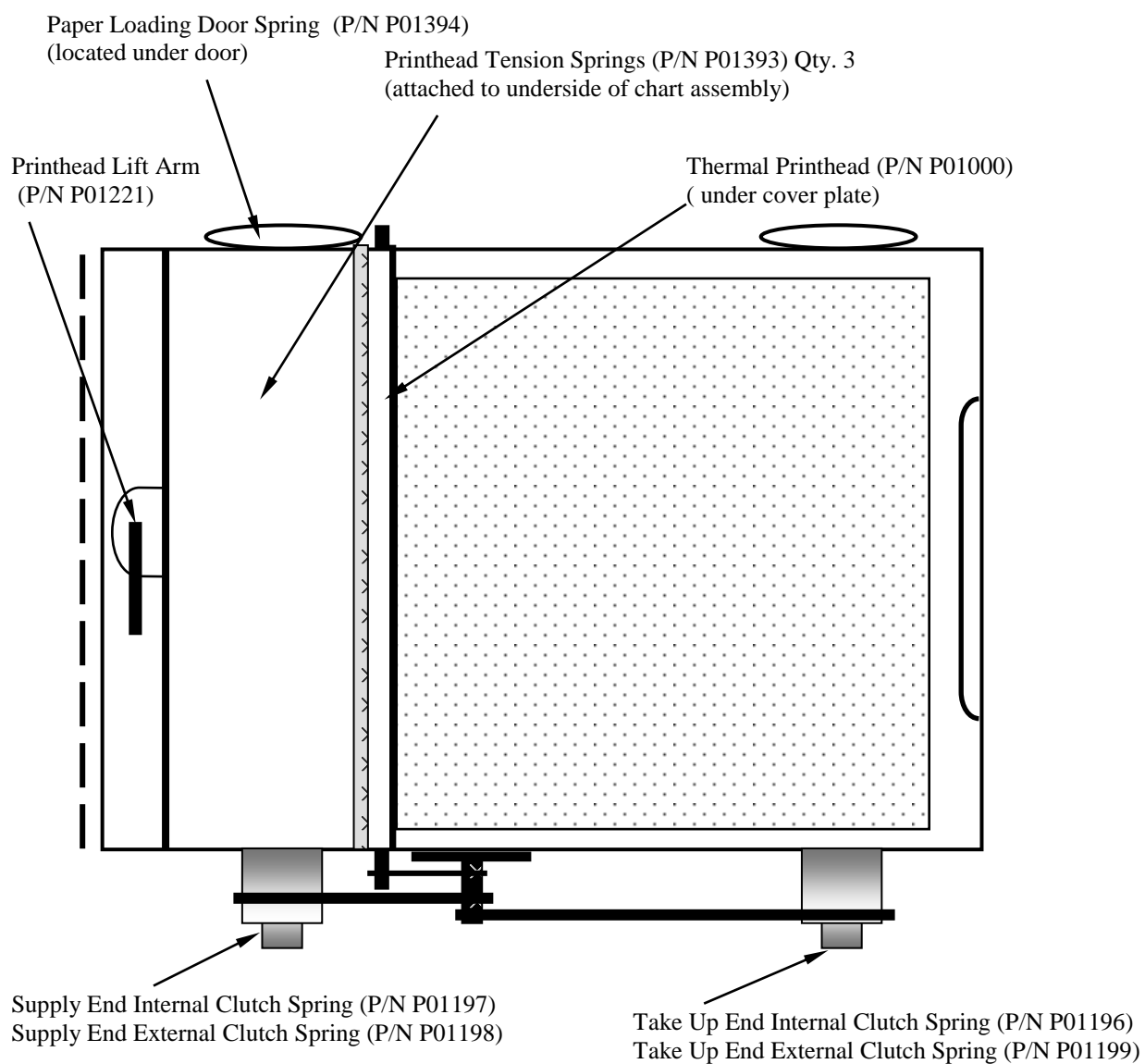


CHART MODULE - EXTERIOR FRONT VIEW

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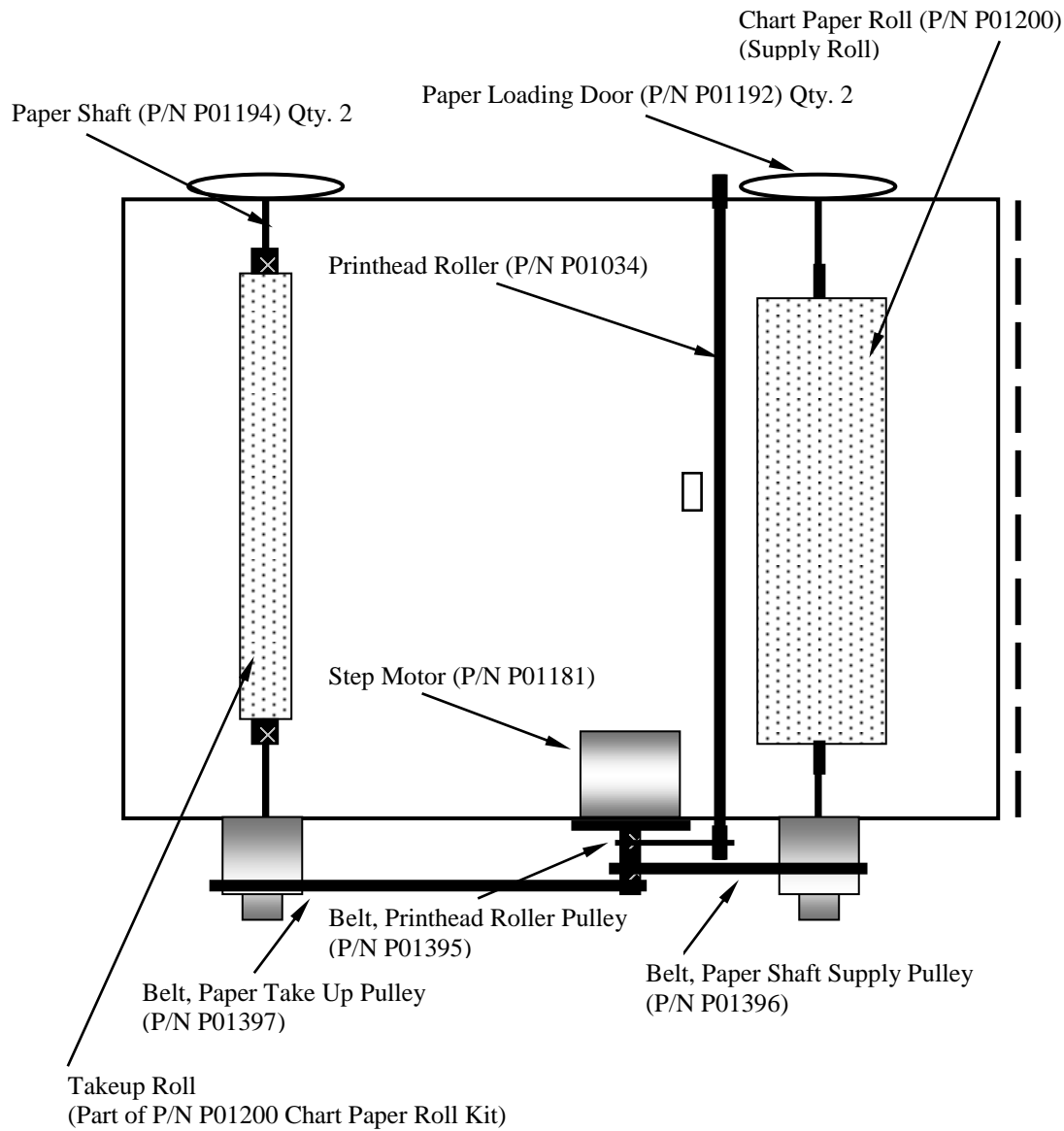
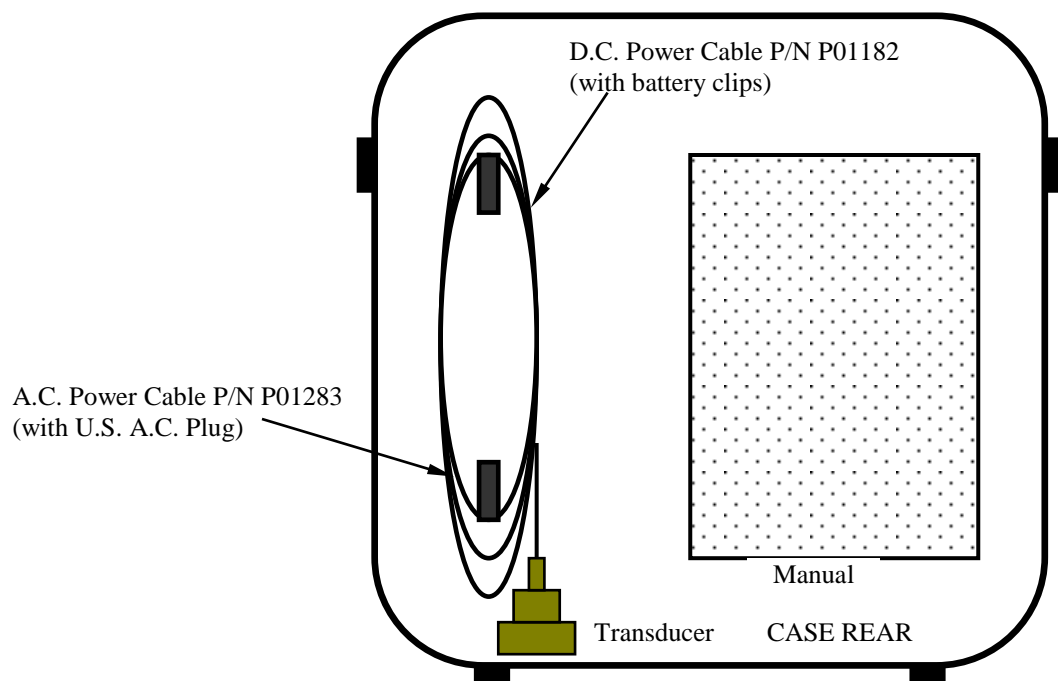


CHART MODULE - UNDERSIDE VIEW

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4.6 SPARE PARTS

<u>SYQWEST Part Number</u>	<u>Description</u>
P01000	Thermal Printhead
P01001	Handle (carrying)
P01003	Gasket, Door
P01005	Catch
P01550	Gasket, Case
P01031	Rubber Bumper
P01034	Printhead Roller
P01042	Door Window
P01044	Data I/O Plug (complete kit)
P01050	Key/Display PCB
P01060	Print/Drive PCB
P01080	Power Supply
P01181	Step Motor
P01182	D.C. Power Cable Assy. (with battery dips)
P01183	A.C. Power Cable Assy (with U.S. plug)
P01184	D.C. Fuse
P01185	A.C. Fuse
P01615	Membrane Decal (for keypad)
P01190	Keypad
P01192	Paper Loading Door
P01528	Window for LCD display
P01194	Paper Shaft
P01195	Paper Sensor PCB
P01196	Take-up End Internal Clutch
P01197	Supply End Internal Clutch
P01198	Supply End External Clutch
P01199	Take-up End Internal Clutch
P01200	Chart Paper Poll Kit (with take-up roll)
P01221	Print Head Lift Arm
P01234	P. Head-A Cable to Print/Drive PCB
P01235	P. Head-B Cable to Print/Drive PCB
P01251	Flex-Cable (Keypad to Key/Display PCB)
P01271	A.C. Power Chassis Harness Assy
P01272	D.C. Power Chassis Harness Assy
P01273	Transducer Chassis Harness Assy
P01274	FIX Mark Chassis Harness Assy
P01275	Paper Sensor Harness Assy
P01393	Print Head Tension Spring
P01394	Paper Loading Door Spring
P01395	Belt, Print Head Roller Pulley
P01396	Belt, Paper Supply Shaft Pulley
P01397	Belt, Paper Take-up Pulley
P01401	H.V. Protective Cover
P01475	Lamp PCB
P01477	Lamp
P01526	Bezel for Decal/Keypad
P01533	Backlight Keypad PCB

Note: See **Error! Reference source not found.** for a listing of part numbers and descriptions of memory modules (software housed or microchips).

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APPENDIX A. - SPEED OF SOUND**(as a function of salinity & temperature)****SV Table**

TEMP \ SAL	0 ppt.	5 ppt.	10 ppt.	15 ppt.	20 ppt.	25 ppt.	30 ppt.	35 ppt.	40 ppt.
0 deg. C	1400	1407	1414	1421	1481	1435	1442	1449	1445
5 deg. C	1424	1431	1437	1444	1451	1457	1464	1470	1447
10 deg. C	1445	1452	1458	1464	1471	1477	1483	1490	1496
15 deg. C	1464	1470	1476	1482	1488	1495	1501	1507	1513
20 deg. C	1481	1487	1493	1498	1504	1510	1516	1521	1527
25 deg. C	1496	1502	1507	1513	1518	1523	1529	1534	11540
30 deg. C	1510	1515	1520	1525	1530	1535	1540	1546	1551
35 deg. C	1522	1526	1531	1536	1541	1546	1551	1555	1560
40 deg. C	1532	1537	1541	1546	1551	1555	1560	1564	1569

(Speed of Sound values are in meters per second)

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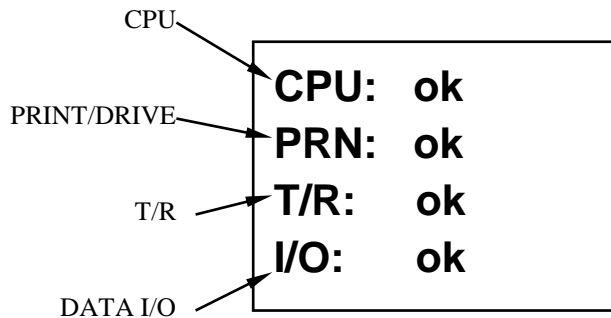
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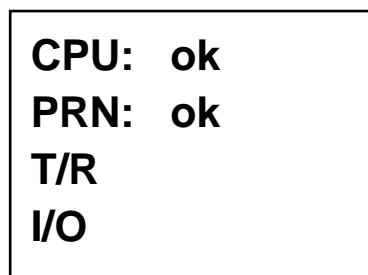
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APPENDIX B. - SELF TEST FEATURE

Your Bathy-500HD contains an automatic self-test, which is initiated each time the unit is turned on. The display shown below generally indicates a properly functioning Bathy-500HD. Upon normal self-test (no errors found), this display screen will automatically clear itself.



As shown above, the designation "ok" next to the designation indicates normal (proper) functioning. Should the self-test routine detect an error, the self-test will halt after the last operation is tested; The procedure will not continue until the first problem is corrected. Then upon power-up again, the procedure will continue. For example, the display shown below indicates proper operation of the CPU and Print/Drive but a failure with the T/R. The Data I/O cannot thus be tested until the T/R is repaired.



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APPENDIX C. - LIST OF STORED PARAMETERS

When power is turned off to your Bathy-500HD, the following parameter values will be stored in memory; Upon re-application of power, these values will reappear and thus be used unless changed by the user.

- Gain Mode & Value (TVG Value)
- Units: (Feet or Meters)
- Range
- CAL (Speed of Sound)
- Paper Remaining (% of roll unused)
- Chart Print Contrast
- Chart Print Status: (On or Off)
- COM Format (Output Type)
- Display Mode: (Status Display Page or Depth Readout Page)