320M Echosounder

Operator Controls Manual

Supports Software Package: D429-04216

D101-05061
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CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

1.1 About this manual

This manual provides detailed information about the front panel operator controls for 320M Echosounders. This manual provides basic operational instructions and detailed descriptions of all the functions accessible from the echosounder front panel.

Section 1 provides a brief summary of the contents of this manual.

Section 2 describes the 320M's Front Panel.

Section 3 describes the front panel's Primary Function Controls that give the 320M its traditional echosounder look and feel

Section 4 describes the front panel's Secondary Function Interface which provides access to all of the Secondary Functions and Parameters.

Section 5 details the operation of the Secondary Function Interface and the various menus that provide the operator with access to the more advanced functions.

Section 6 details the few front panel controls and feedback LEDs on the 320M's built-in thermal recorder.

1.2 320M Technical Support

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1.3 Notational Conventions

When a front panel control is mentioned in the text, it appears in **CAPITAL LETTERS AND BOLDFACE**, much as it actually appears on the echosounder.

When a user controlled parameter is mentioned in the text, it appears in **boldface**.

Italics are used for important concepts, like the display *window*.

2 THE FRONT PANEL

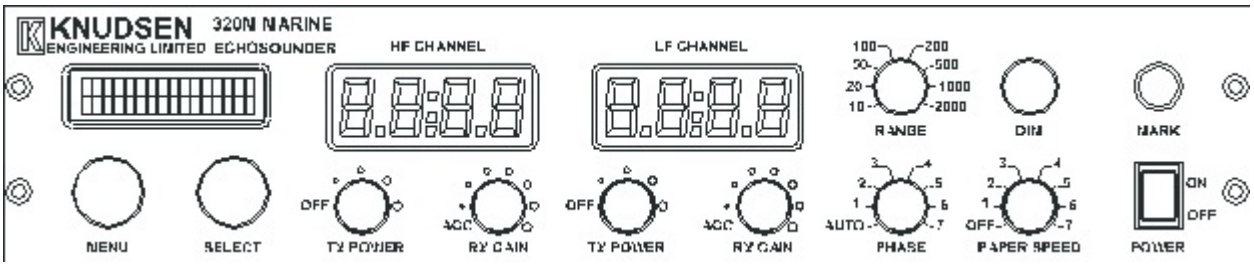

Figure 2-1. 320M Front Panel

The front panel of the 320M Survey Echosounder is shown in Figure 2-1. It contains all of the *primary functions* - those functions for which dedicated front panel access is provided. These include the **4-digit LCD depth displays**, and the following controls:

POWER,
PAPER SPEED,
DIM,
RANGE,
PHASE,
TX POWER,
RX GAIN.

The primary functions and their operation is described in Section 3.

Also on the front panel is the *secondary function* interface, which consists of two identical controls:

MENU,
SELECT.

These are combination rotary optoswitches and pushbuttons, and are used in conjunction with the **2 line by 16 character LCD display** to control all of the echosounder's secondary functions. The secondary function interface and its operation is described in Section 4.

It should be noted that all 320M control functions, whether primary or secondary, are "soft-coded" in that switches never control hardware directly, but merely provide information to the 320M's computer. The operational characteristics of the echosounder are completely under software control.

Note that the 320M never changes parameter values in the middle of a ping-echo cycle. Although operator input is acknowledged immediately, the changes do not take effect until the beginning of the next ping.

3 PRIMARY FUNCTIONS

3.1 POWER

This rocker switch provides power to the Echosounder. With this switch turned on, the Secondary Function Interface, serial ports and front panel switches are active. The **TX POWER** switches control the echosounding function, and the **PAPER SPEED** switch controls the hard copy recording function.

3.2 HF CHANNEL/LF CHANNEL LCDs

These four-digit LCD displays show the depth produced by the depth detection software. This detection software examines the filtered envelope (amplitude/time record or echogram) of the received signal to locate the bottom echo and thus determine the depth. This depth is corrected for **sound speed** and **draft** (and heave, if a heave sensor is connected and configured), converted to a distance in metres (or feet or fathoms, as the case may be), and displayed. Each new depth value is compared with the depths from previous pings, and if they do not agree to within a specified limit (referred to as the **tracking gate**), the depth is considered invalid and the display shows "**----**" instead of a numerical value.

If **TX POWER** is switched to **OFF**, the depth display indicates the state by displaying "**OFF**".

3.3 RX GAIN

The **RX GAIN** switch controls the analog **receive gain** of the relevant channel. Reducing the analog **receive gain** is useful when sounding in extremely shallow water. This reduces the overall noise while not seriously affecting echo strength. Increasing the analog gain is useful when sounding in very deep water. The **AGC** selection invokes automatic gain control which is the recommended setting for most operating conditions.

3.4 TX POWER

The **TX POWER** switch is used to turn the channel on and to specify the **transmit power** level of the pulse being transmitted. Power levels are controlled by changing the duty cycle of the switchmode transmitter output stage. Although high power signals will always give the strongest echoes, they also produce more ringing and reverberation which may obscure the bottom echo in shallow water. Using high **receive gain** in combination with high **transmit power** in shallow water may cause signal levels high enough to saturate (overload) the receiver, which will mask any echoes.

3.5 RANGE

The **RANGE** switch selects the size of the active *window* in the water column. The active *window* is the only part of the water column in which the echosounder operates. It is the portion of the water column which is printed on the hard copy recorder, and in which the bottom detection software looks for the bottom echo. The bottom *must* be in the selected *window* for the echosounder to function. Eight ranges are available: 10, 20, 50, 100, 200, 500, 1000, and 2000 metres (or feet or fathoms).

3.6 PHASE

The **PHASE** switch selects the depth, or location in the water column, of the active *window* (see explanation in previous section). The effect of the **PHASE** switch depends on the current **RANGE** setting. The standard 320M software compilation provides a 50% overlap between **PHASE** settings.

Table 3-1. Window Limits as defined by Range and first 7 Phases (50% overlap)

Phase	Range							
	10	**20**	**50**	**100**	**200**	**500**	**1000**	**2000**
1	0-10	0-20	0-50	0-100	0-200	0-500	0-1000	0-2000
2	5-15	10-30	25-75	50-150	100-300	250-750	500-1500	1000-3000
3	10-20	20-40	50-100	100-200	200-400	500-1000	1000-2000	2000-4000
4	15-25	30-50	75-125	150-250	300-500	750-1250	1500-2500	3000-5000
5	20-30	40-60	100-150	200-300	400-600	1000-1500	2000-3000	4000-6000
6	25-35	50-70	125-175	250-350	500-700	1250-1750	2500-3500	5000-7000
7	30-40	60-80	150-200	300-400	600-800	1500-2000	3000-4000	6000-8000

3.6.1 Autophase

When the **PHASE** control is set to **AUTO**, the phase changes are performed automatically in response to information provided by the **primary channel** bottom tracking algorithm. The auto phasing software adjusts the **phase** setting automatically to maintain the bottom in the active *window*. It should be understood that the auto phasing software is critically dependent on the bottom tracking software - if the bottom is not being tracked successfully, auto phasing will not work.

It is helpful to think of the auto phasing software as having two distinct operating states - searching for the bottom and tracking the bottom. When the **autophase** mode is initially invoked, or whenever the bottom tracking software loses track of the bottom, the auto phasing software shifts into the *bottom search* state. In this state the *window* is opened up to the full extent of the water column from **minimum depth limit** to **maximum depth limit**. The ping rate usually slows down noticeably because of the larger *window*. When the bottom is found, the auto phasing software selects the appropriate phase and shifts into the *bottom tracking*

state. In this state, the **minimum depth limit** and **maximum depth limit** parameters do not allow the digitization of depth data that fall outside of the depth limits; this is intended to prevent false digitization on thermocline layers, biological scattering layers, and overly strong multiple returns.

Once the auto phasing software is in the *bottom tracking* state, it will continue to auto phase as long as the primary channel is being tracked successfully. It will re-enter the *bottom search state* if 5 consecutive samples are declared invalid by the bottom tracking software.

Before invoking the **autophase** mode, it is a good idea to set the **minimum depth limit** and **maximum depth limit** parameters using the secondary controls menu (see Section 5.5).

One other parameter is relevant to auto phasing operation - this is the **primary channel**, accessible through the secondary controls menu, and described in Section 5.6). This parameter can be set to either **HF** (the default) or **LF**. It specifies the channel which is used as the depth reference for phase changes.

3.6.2 Bottom Tracking

Although the bottom tracking process is operational at all times, it is discussed here because it becomes critically important when auto phasing is enabled.

Locating and tracking the bottom is one of the more important software functions performed by the echosounder. The term *bottom tracking* encompasses the process of identifying the bottom echo in the received acoustic signal, locating the precise leading edge of the echo, computing the depth based on travel time and sound speed considerations, and most importantly, deciding whether the result represents a valid depth measurement (it might be a fish, or transducer ringing, or reverberation, or just noise, or even the second echo from the previous ping). The decision must be made immediately, before sending the depth value to the datalogger. The echosounder software, running in real time, does not have the luxury of looking ahead - it can only look back at previous depth samples. The algorithm used in the 320M uses the several previous samples, regardless of whether they were determined at the time to be valid or not (the rationale for including invalid samples in the test is the fundamental uncertainty in the validity designation). A variety of least squares curve fitting exercises is then carried out using the current sample and all or some of the previous several samples. If at least one of the curves fits the data to within a user-specified **tracking gate** tolerance, the current sample is declared to be valid.

Note that bottom tracking is performed independently for each channel. The depth value used by the auto phasing software is specified by the **primary channel** parameter.

3.6.3 Extended Phases Compilation Option

Manual phase control is typically physically limited to the 7 selections provided by the **PHASE** switch. If the EchoControlClient supplied as part of the supporting software package is used for system control, it does not limit the available phases based on the switch but provides up to 254 phases in **autophase** mode. This permits a relatively small window to be used in deep water which is not normally supported by the basic front panel control configuration.

3.7 MARK

The **MARK** button is used to initiate an event mark (also called a fix mark) on the hardcopy recorder. Pressing the **MARK** button while the printer is recording, will print an event mark indicating time, date, LF and HF depth readings, GPS position (if available), and mark source (M) on the hardcopy.

3.8 PAPER SPEED

The **PAPER SPEED** knob is a holdover from older systems. The **OFF** position disables all printing activity. Any of the numbered switch positions starts the printing and links the paper speed to the ping rate by printing one line and advancing the paper one line for each ping/echo cycle.

3.9 DIM

This knob controls the illumination brightness for all of the front panel LCD displays.

4 SECONDARY FUNCTION INTERFACE

The Secondary Function Interface consists of the **MENU** and **SELECT** switches and the **2 line by 16 character LCD display**. The **MENU** and **SELECT** switches are combination rotary optoswitches and pushbuttons, and as explained below, they allow the user access to a wide range of secondary functions.

4.1 MENU

The **MENU** control is a combination rotary optoswitch and pushbutton. Rotating the knob causes a succession of secondary function "menus" to be displayed on the 2 line by 16 character LCD display. With each new position of the **MENU** knob, a new secondary function menu screen is displayed. Note that the optoswitch is soft-coded, and that specific physical angles of rotation do not correspond to specific menu items. The optoswitch functions more in the manner of a mouse or a trackball.

4.2 SELECT

Adjustment of the parameters that are displayed in the secondary function menu screens is accomplished with the **SELECT** switch. The **SELECT** control is also a combination rotary optoswitch and pushbutton. When the knob is rotated, the adjustments appear immediately on the active display window; however new parameter values are not used until the next transmit-receive cycle.

4.3 "*" and "?" Indicators

There are two special symbols used in the Secondary Function Interface to provide the user with important information.

If a menu screen displays an "*" in the lower right hand corner, that means there is at least one sub-menu screen accessible from this point. Pressing the **MENU** knob allows the user to enter a sub-menu. Repeated pressing of the **MENU** knob lets the user cycle through all available sub-menus, eventually returning to the root level. Rotating the **MENU** knob from any menu or sub-menu transfers the user to the root level screen of the next **MENU** selection.

If a menu screen displays a "?" after a parameter selection, it means that the user must acknowledge the selection before it will be used by the echosounder. This is accomplished by pressing the **SELECT** knob. After the **SELECT** is pressed, the "?" symbol disappears indicating that the parameter value displayed had been stored and will be used in the next transmit-receive cycle.

4.4 Menu Lock-out Control

The Secondary Interface menus can be locked to prevent accidental modification of operational parameters. The user simply presses and holds the **MENU** knob down for about a 6 second count. This causes the display to change to a simple clock display screen. While this display is present, the user cannot access the menus. To unlock the interface, the user presses and holds the **MENU** knob down for another 6 second count. This will restore the last active menu screen, and restores the ability to modify parameters.

5 SECONDARY FUNCTIONS

5.1 Overview

This section outlines the standard Secondary Functions and the manner in which the operator accesses them through the Secondary Function Interface described in the previous section.

Secondary function parameters differ from the primary parameters in that they are truly soft-coded - their current value is not tied to the orientation of a physical switch on the front panel, such as **RX GAIN** for example.

See Figure 5-1 for a flowchart that summarizes the structure of the secondary function menus and sub-menus. All of the following descriptions are written based on a dual-channel system. If the unit is a single channel system only, the individual HF/LF parameter references are replaced by single channel references only.

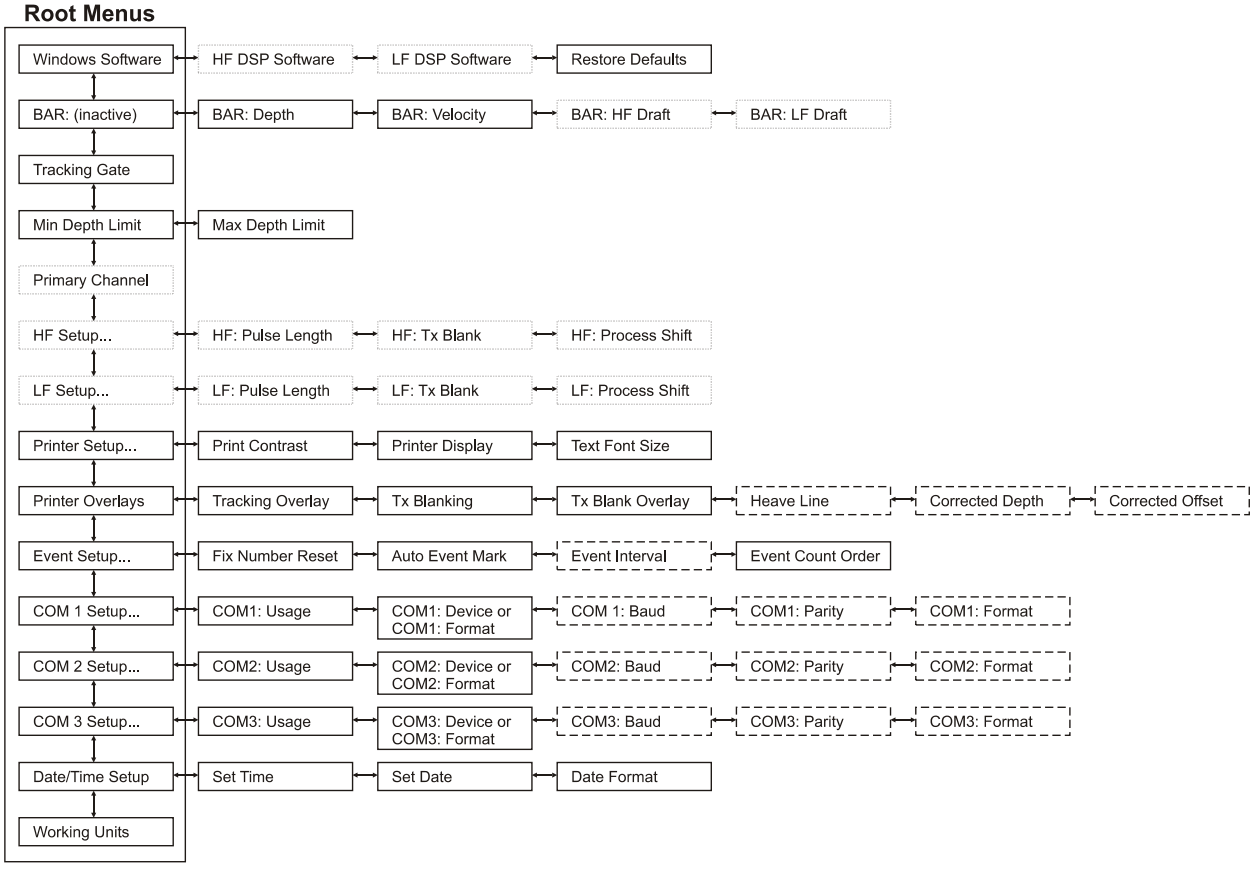

Figure 5-1. Menu Structure

5.2 Windows Software

This root level screen displays the current part number and version number of the Windows EchoControlServer application running on the internal embedded computer. There is no parameter selection here, simply information about the system configuration.

5.2.1 HF DSP Software

This sub-menu screen displays the part number and version number of the HF channel's DSP module which is sent from the module itself. This is a quick indicator that the USB communications from the DSP module to the internal computer is functional. If the numbers displayed are zeros, the communication link has not worked, or the module is not present. No action can be taken from this screen - this is an information-only item.

5.2.2 LF DSP Software

This sub-menu screen displays the part number and version number of the HF channel's DSP module which is sent from the module itself. This is a quick indicator that the USB communications from the DSP module to the internal computer is functional. If the numbers displayed are zeros, the communication link has not worked, or the module is not present. In single channel units, this screen will display zeros. No action can be taken from this screen - this is an information-only item.

5.2.3 Restore Defaults

Pressing **SELECT** while in this sub-menu loads all of the secondary function parameters with factory default values.

5.3 Bar Check

This multi-parameter, root level menu item provides access to the primary calibration parameters: **sound velocity**, **HF draft** and **LF draft**. When this menu item is first selected (by rotating the **MENU** knob until the word **BAR** appears), the current values of all three parameters are simultaneously displayed. Pressing **MENU** puts the echosounder into a special bar check mode in which one additional parameter, **bar depth**, appears in the display window. Pressing **MENU** at this point permits the user to cycle through and modify the four visible parameters.

In the special bar check mode, the digitizer search window is centred on the specified **bar depth** and is narrowed to the width of the **tracking gate**.

The bar check menu item is unusual in that it displays values of all four parameters simultaneously. The user simply presses the **MENU** knob to cycle through the four parameters and rotates the **SELECT** knob to modify the currently selected parameter, which is identified by an arrow pointer. Rotating the **MENU** knob to another menu screen deactivates the bar check mode, and restores the standard digitizer search window.

For a description of typical bar check procedures, see D10-02251 Echosounder Concepts Technical Note.

5.3.1 Bar Depth

Range:	1- 99 (units dependent on working units selection)
Increment:	1
Default:	10

The user adjusts this parameter to centre the digitizer search window around the expected depth of the test bar. The width of the search window around this centre value is determined by the size of the **tracking gate** (Section 6.4). The echosounder will digitize on the strongest target that falls within this search window. If no target is found, the depth displays will indicate an invalid depth return ("----" appears in the 4-digit display).

5.3.2 Sound Velocity

Range:	1300 - 1700m/s	or	4265 - 5577 ft/s	or	710 - 929 fm/s
Increment:	1m/s		1 ft/s		1 fm/s
Default:	1500m/s		4921 ft/s		850 fm/s

This feature allows the adjustment of the velocity of sound value used by the echosounder for all depth calculations. The user adjusts this value in the course of a bar check, or enters the average expected velocity of sound over the water column of interest obtained from a sound speed sensor.

5.3.3 HF Draft

Range:	0 - 100.00 m	or	0 - 328.08 ft	or	0 - 54.68 fm
Increment:	0.01 m		0.01 ft		0.01 fm
Default:	0		0		0

Draft indicates the vertical distance from the surface of the water to the active face of the transducer. Its main use is to ensure that the echosounder's output is corrected for transducer depth. The draft can be set independently for the low frequency and high frequency channels.

5.3.4 LF Draft

Range:	0 - 100.00 m	or	0 - 328.08 ft	or	0 - 54.68 fm
Increment:	0.01 m		0.01 ft		0.01 fm
Default:	0		0		0

Draft indicates the vertical distance from the transducer to the surface of the water. Its main use is to ensure that the echosounder's output is corrected for transducer depth. The draft can be set independently for the low frequency and high frequency channels.

5.4 Tracking Gate

Range: 2 - 200 [m] or [ft] or [fm]
Increment 1
Default: 20

The **tracking gate** parameter is used by the bottom tracking algorithm to determine the validity of the current depth value. It is a depth variability tolerance value, defined as a distance above or below the bottom depth trend established by the current and several previous samples. If the most recent depth value fits this established trend to within the range defined by the **tracking gate**, it is considered valid and is displayed on the four-digit LCD. If a depth return falls outside of this range, it is deemed invalid and "----" is displayed on the LCD..

For a discussion of the bottom tracking algorithm see Section 3.6.3.

5.5 Depth Limits

This two-parameter root level menu item provides access to the **minimum depth** and **maximum depth** parameters which define the search *window* for bottom acquisition during auto phasing. When **AUTO PHASE** is first invoked, or when the bottom tracking algorithm for the **primary channel** loses bottom lock, the auto phasing software opens up the *window* to the full extent of the water column from **minimum depth** to **maximum depth** until it finds the bottom. If the system is not in AUTO PHASE, the bottom tracking is not allowed to accept depths outside the set limits. This is to allow settings to prevent false tracking on thermoclines and biological scattering layers.

Pressing **MENU** here toggles between **minimum depth** and **maximum depth**.

5.5.1 Minimum Depth

Range: 0 - 11995
Increment: depends on current value
Default: 0

5.5.2 Maximum Depth

Range: 20 - 12000
Increment: depends on current value
Default: 12000

5.6 Primary Channel

Range: HF / LF
Increment: N/A
Default: HF

The **primary channel** parameter defines the frequency channel used as the reference depth for the auto phasing algorithm. The printer software uses **primary channel** data for channel-specific overlays (see Printer Overlays, Section 5.12) in the case where both channels are superimposed and only one channel's overlays can be printed.

The **primary channel** designation only has effect when both channels of a dual-channel echosounder are ON. If only one channel is on, it is automatically considered to be the primary channel.

5.7 HF Setup

This is a root level menu item whose sole purpose is to provide a header for the three sub-menus.

5.7.1 HF Pulse Length

Range: Frequency specific
Increment: N/A
Default: N/A

This sub-menu allows the user to specify the high frequency **pulse length**, the duration of the transmit pulse, usually specified in milliseconds or fractions of a millisecond. The choices are frequency specific. Generally, the higher frequencies use shorter pulses and vice versa.

By specifying the **pulse length**, the user indirectly specifies the bandwidth of the digital noise rejection filter applied to the incoming acoustic signal data. The filter bandwidth is usually set to the inverse of the **pulse length** (this relationship is true for the standard continuous wave (CW) signals, but not necessarily for the CHIRP signals used in the very low frequency channels).

Normally, long pulses with narrow bandwidth filters provide better noise rejection in deeper water or noisy conditions, while short pulses with wide bandwidth filters provide better resolution when conditions permit or the water is shallow.

The signal data rate (in samples per second) is also related to the **pulse length** because of the Nyquist requirement that the sampling frequency be at least twice the signal bandwidth. Under rare extreme conditions where the user has specified a very short pulse in deep water or a very long pulse in shallow water, the echosounder will override the user's **pulse length** selection to meet data rate requirements. When this happens, the **pulse length** parameter value is not changed, and is used again as soon as the extreme conditions are removed.

5.7.2 HF Tx Blank

Range:	0 - 300.0 m	or	0 - 984.3 ft	or	0 - 164.0 fm
Increment:	0.1 m		0.1 ft		0.1 fm
Default:	2.5 m		8.2 ft		1.3 fm

The high frequency **transmit blanking** value is the distance, measured from the face of the HF transducer, to the point in the water column at which the bottom detection software begins to look for the bottom. **Transmit blanking** must be set large enough that transducer ringing following the tail end of the transmit pulse is not falsely interpreted as the echo from a very shallow bottom, but small enough not to unduly limit the minimum depth capability of the echosounder. The optimum value depends on the expected depth conditions, the **pulse length,** the **transmit power** level and the signal frequency. It is best determined by experimentation. Note that **transmit blanking** has effect only when it extends into the *window*, typically when **PHASE** is 1.

5.7.3 HF Process Shift

Range:	off, 1 to 100
Increment:	1
Default:	off

The **Processing Shift** parameter is basically a scaling factor applied to the digital signal filters (digital gain). This factor can help to pull up otherwise weak and poor quality signals to a usable level.

5.8 LF Setup

This is a root menu item whose sole purpose is to provide a header for the sub-menus.

5.8.1 LF Pulse Length

See **HF Pulse Length**, Section 5.7.1.

5.8.2 LF Tx Blank

See **HF Tx Blank**, Section5.7.2.

5.8.3 LF Process Shift

See **HF Process Shift**, Section 5.7.3.

5.9 Printer Setup

This root level menu screen provides access to a number of options for print contrast, depth grid and text overlay control (graphic overlay control is managed in the next root level menu item). Repeatedly pressing the **MENU** knob will allow the user to access the various options until eventually the original screen reappears indicating all options have been accessed. It is safe to exit by rotating the **MENU** knob from inside any of the option screens.

5.9.1 Print Contrast

Range: -3 to 3
Increment: 1
Default: 0

From this sub-menu, the **print contrast** scale factor can be adjusted until meaningful results are achieved on the hardcopy record. Each increment represents a factor of two increase or decrease in signal intensity.

5.9.2 Printer Display

Range: Overlayed / Stacked
Increment: N/A
Default: Overlayed

This menu allows the user to select the data display format on the hardcopy record. There is an overlayed graph option which has the data from two channels superimposed and displayed in one large presentation of 1600 pixels. The stacked option has the HF channel data displayed in the upper 800 pixels and the LF channel data displayed in the lower 800 pixels.

5.9.3 Text Font Size

Range: small/large
Increment: N/A
Default: small

Text font size sets the size of grid and annotation text characters overlaid on the hardcopy printout.

5.10 Printer Overlays

This is a root menu item whose sole purpose is to provide a header for the sub-menus. Pressing **MENU** takes you to the first sub-menu, **Tracking Overlay**.

5.10.1 Tracking Overlay

Range: off / on
Increment: N/A
Default: off

This option allows the tracking gate to be displayed on the hardcopy record as a pair of lines framing the detected bottom. The distance between these lines is specified by the **tracking gate** parameter (Section 5.4). If the printer is in overlayed chart mode, only the gate overlay for the **primary channel** is displayed. If the printer is in stacked chart mode, the gate overlays for each channel are displayed.

5.10.2 Tx Blanking

Range: off / on
Increment: N/A
Default: off

This sub-menu item allows the user to blank out the transmit pulse portion of the signal echogram on the printed record. If the **Tx Blanking** mode is **ON**, all of the printed pixels between the start of the transmit line and the **transmit blanking** depth are replaced with white. The **transmit blanking** depth in this context refers to the **LF Tx Blank** and **HF Tx Blank** parameters described in Sections 5.7.2 and 5.8.2. If the overlayed printer display mode is in use, and both channels are on, the **transmit blanking** depth set for the **primary channel** is used.

If the **Tx Blanking** mode is **OFF** (ie, the transmit pulse is *not* blanked), the transmit portion of the printed echogram is printed normally as the rest of the echogram.

5.10.3 Tx Blank Overlay

Range: off / on
Increment: N/A
Default: off

This option allows the **transmit blanking** value to be displayed on the hardcopy record as a thin solid line. If the overlayed printer display mode is in use, and both channels are on, the **transmit blanking** depth set for the **primary channel** is used.

Pressing **MENU** will take the user to the next sub-menu, **Heave Line**.

5.10.4 Heave Line

Range: off / on
Increment: N/A
Default: off

This option allows the heave value received from the sensor to be displayed on the hardcopy record as a thin solid line located near the top of the record. The heave line overlay provides a quality indicator via the thickness of the line; a heave data value with a good quality flag is represented by a thin line, and a poor quality value is represented by a thickening of the line. The overlay appears only if a heave device driver has been selected and activated on a **COM** port.

5.10.5 Corrected Depth

Range: off / on
Increment: N/A
Default: off

This option allows the heave-corrected depth for a channel to be displayed on the hardcopy record as a thick line overlay located at the corrected depth position plus some user selected **offset** (Section 6.12.6). The grey scale record shows the uncorrected bottom (which in this context mean uncorrected for heave, but corrected for **draft**). The **corrected depth** overlay is corrected for both heave and **draft**. If the overlayed printer display mode is in use, and both channels are on, the **corrected depth** overlay for the **primary channel** is used.

Pressing **MENU** here will take the user to the sub-menu, **Corrected Offset**.

5.10.6 Corrected Offset

Range: -500.0 to + 500.0 [m] or [ft] or [fm](maximum limited by current range selection)
Increment: 0.1
Default: 0

This option allows the user to select the vertical **offset** (position) for the **corrected depth** overlay. The overlay is printed on the graph at the corrected depth plus the offset value.

5.11 Event Setup

This root level menu item is a header only.

5.11.1 Fix Number Reset

Range: current=xxxxx / reset to one? / select number?
Increment: N/A
Default: current=xxxxx

This option displays the event mark number which will be associated with the very next event mark. Rotate **SELECT** one location to the right and a prompt will appear for resetting the event number back to one. Press **SELECT** to reset the event number, and the screen will re-display the event number now set back to one. The next event to occur will be tagged as event number 1. If instead you wish to set the event number to a pre-define value other than one, rotate **SELECT** to the right to get to the "select number?" prompt. Press **SELECT** and a new prompt will appear for setting the number. Spin the **SELECT** knob until the event number equals the desired value. Press **SELECT** to set the event number to this pre-defined value. The next event to occur will tagged with this pre-defined number. The event mark number ranges from 00001 to 65535. Once the event number reaches 65535, it will reset to 00000 and continue incrementing from that value.

5.11.2 Auto Event Mark

Range: off / on
Increment: N/A
Default: off

This option allows the user to start/stop a timebase controlled event mark. The event marks occur at the time interval selected in the **Event Interval** menu.

5.11.3 Event Interval

Range: 2 seconds - 3600 seconds
Increment: 1 second for 2 to 60 seconds; 30 seconds for 60 to 3600 seconds
Default: 10 seconds

This option allows the user to set the time interval for the timebase controlled event mark. Pressing **SELECT** causes an immediate timer event mark from which subsequent event marks are referenced. This sub-menu item will only appear if **Auto Event Marks** are on.

5.11.4 Event Count Order

Range: down / up
Increment: N/A
Default: up

This option allows the user to toggle the direction of the fix mark number counter. By default, the system would count up from the initial fix number selection. By toggling to the down option, the system can be made to count down instead. When the event number counts up to the maximum supported number, 65535, the system will wrap the value back to zero. If the counter counts down past zero, the system wraps the value to the maximum supported number, 65535.

5.12 COM 1 SETUP

This is the root level menu item indicating that the sub-menus access the parameters for the **COM 1** port. Hitting **MENU** at this menu takes the user to first of the **COM 1** sub-menus.

Table 5-1. 320M Serial Interface: Peripheral Devices / Datalogging Formats

USAGE: Peripheral		
Menu Entry	**Device Type**	**Interface Information**
NMEA: $GPGLL	GPS Receiver	Any GPS receiver that can output the NMEA $GPGLL string
NMEA: $GPGGA	GPS Receiver	Any GPS receiver that can output the NMEA $GPGGA string
TSS1	Heave Sensor	TSS Models: TSS1 format
TSS3	Heave Sensor	TSS Models: TSS3 format
POSMV: EM1000	Heave Sensor	POS/MV Models: EM1000 Tate-Bryant Format
POSMV: EM3000	Heave Sensor	POS/MV Models: EM3000 Tate-Bryant Format
SEATEX: MRU	Heave Sensor	MRU Model: When the port is first initialized, it sends a command to the MRU to configure the output to contain roll, pitch, heading, heave, time ticks. Only the heave field is used.
NMEA: $GPGMP	GPS Receiver	Any GPS receiver that can output the NMEA $GPGMP string
Navy Remote	Remote Depth Display	Another Remote Depth Display Unit
USAGE: Data Logging		
Menu Entry	**Format Description**	
CONFIGURABLE	KEL proprietary configurable format	
NMEA: SDDBT	NMEA standard SDDBT output, single channel of data only	
ANNOTATION	Allocates the port for receipt of annotation data from external sources	

5.12.1 COM 1: Usage

Range: none / see Table 6-1
Increment: N/A
Default: none

This sub-menu controls the selection for the type of interface for the COM port. The port can accept inputs from Peripheral devices or can output Data Logging strings to external data loggers.

5.12.2 COM 1: Device or COM 1: Format

Range: none / see Table 5-1
Increment: N/A
Default: none

Dependent on the usage option selected in the previous menu, this menu will control the selection of a peripheral device or a data logging output format. For peripheral device, if a certain device type, such as a GPS receiver, is already selected for another port, another device of the type cannot be selected on the current port. Peripheral devices and data logging formats that are currently supported are listed in Table 5-1.

5.12.3 COM 1: Baud

Range: 300 / 600 / 1200 / 2400 / 4800 / 9600 / 19200 (/ 38400)
Increment: N/A
Default: 19200

This feature controls the communication speed of the **COM 1** port. Set to match that of external device.

5.12.4 COM 1: Parity

Range: none / odd / even
Increment: N/A
Default: none

This feature controls the parity for the **COM 1** port. Set to match that of external device.

5.12.5 COM 1: Data/Stop

Range: 8 data/1 stop / 7 data/2 stop
Increment: N/A
Default: 8 data/1 stop

This feature controls the data format for the **COM 1** port. Set to match that of external device.

5.13 COM 2 Setup

This is the root level menu indicating that the sub-menus access the parameters for the **COM 2** port. Hitting **MENU** at this menu takes the user to first of the **COM 2** sub-menus.

5.13.1 COM 2: Usage

See **COM 1: Usage**, Section 5.12.1.

5.13.2 COM 2: Device or COM 2: Format

See **COM 1: Device or COM 1: Format**, Section 5.12.2.

5.13.3 COM 2: Baud

See **COM 1: Baud**, Section 5.12.3.

5.13.4 COM 2: Parity

See **COM 1: Parity**, Section 5.12.4.

5.13.5 COM 2: Data/Stop

See **COM 1: Data/Stop**, Section 5.12.5.

5.14 COM 3 Setup

This is the root level menu indicating that the sub-menus access the parameters for the **COM 3** port. Hitting **MENU** at this menu takes the user to first of the **COM 3** sub-menus.

5.14.1 COM 3: Usage

See **COM 1: Usage**, Section 5.12.1.

5.14.2 COM 3: Device or COM 3: Format

See **COM 1: Device or COM 1: Format**, Section 5.12.2.

5.14.3 COM 3: Baud

See **COM 1: Baud**, Section 5.12.3.

5.14.4 COM 3: Parity

See **COM 1: Parity**, Section 5.12.4.

5.14.5 COM 3: Data/Stop

See **COM 1: Data/Stop**, Section 5.12.5.

5.15 Date/Time Setup

This root level menu item provides access to the sub-menus for setting the echosounder's time and date..

5.15.1 Set Time

This sub-menu screen provides access to the **hour** and **minute** parameters, and allows the user to set the echosounder time. Note that the hour is recorded using a 24 hour format (no AM or PM). Note that the time displayed will not update with system's clock while the screen is selected.

5.15.1.1 Hour

Range: 0 - 23 hrs.
Increment: 1
Default: N/A

5.15.1.2 Minute

Range: 0 - 59
Increment: 1
Default: N/A

5.15.2 Set Date

This sub-menu screen provides access to the echosounder **date.** Note that the date displayed will not update with the system's clock while the screen is selected.

5.15.2.1 Day

Range: 1 - 31 (max. limit depends on month)
Increment: 1
Default: N/A

5.15.2.2 Month

Range: JAN - DEC
Increment: 1 month
Default: N/A

5.15.2.3 Year

Range: N/A
Increment: 1
Default: N/A

5.16 Working Units

Range:	meters / feet / fathoms
Increment:	N/A
Default:	meters

This feature allows the user to select the desired units of metres, feet or fathoms. When these units are switched, the echosounder recomputes the speed of sound and draft into the appropriate new units.

6 THE THERMAL PRINTER

6.1 Overview

The 320M thermal printer is a high resolution hardcopy device designed to provide a quality record of the echosounder data. It has an automatic self-heating capability as well as temperature dependent burning which ensures consistent operation in various temperature environments. Other features include:

- 1728 pixels per line
- Automatic on/off line control
- LED status indicators
- Line feed control
- 32 level Greyscale mode
- Continuous printing capability
- Optical paper out detector
- Head Unload safety switch
- Built-in take-up reel

6.2 Printer Panel LED states and controls

6.2.1 Status LED

The front panel of the thermal printer has individual status LEDs to indicate whether the printer is ready for use or if it has a fault condition. Most of these LED indicators are fairly self-explanatory.

Table 6-1. Printer LED Indicators

STATUS LED	STATE	FAULT CONDITION
ONLINE	OFF	Printer is offline; if no other indicator LED is active, may indicate lack power to the printer or a processor fault
ONLINE	ON	Printer is online and ready for use
PAPER OUT	ON	Paper sensor read paper out condition
HEAD OPEN	ON	Microswitch indicates head lever is open

6.2.2 ADVANCE button

This pushbutton is used to form feed (advance) the paper. As long as the button is pressed, the paper will advance provided there is paper loaded. Nothing will happen if there is no paper in the system.

6.2.3 TEST PRINT button

The **TEST PRINT** button initiates a built-in test print cycle from the printer control module's embedded code. As long as this test print is active, the printer will ignore all other commands from the 320M system.