

# SGG Knudsen 320 B/R Guide

The 320 B/R deepwater echosounder is configured for using two types of transducers mounted in the hull of the ship. The transducers operate at two different frequencies. The frequencies are 12kHz called the High Frequency (HF) and 3.5kHz called the Low Frequency (LF). The HF has two uses the first, is to record water depth the second, is to track pingers attached to various instruments over the side. The LF is used for sub-bottom profiling applications.

## System Description and Power Up Sequence

The system consists of the following:

- Knudsen 320 B/R Deck Unit
- PC running Windows 2000
- EPC Thermal Recorder

The interface between the PC and the Deck Unit is SCSI. The interface between the PC and EPC Thermal Recorder is Parallel. To avoid hardware communication problems **Use The Following Power Up Sequence:**

- 1. Knudsen 320 B/R Deck Unit System Power**
- 2. EPC Thermal Recorder Power**
- 3. PC Power**
- 4. Knudsen 320 B/R High Voltage**

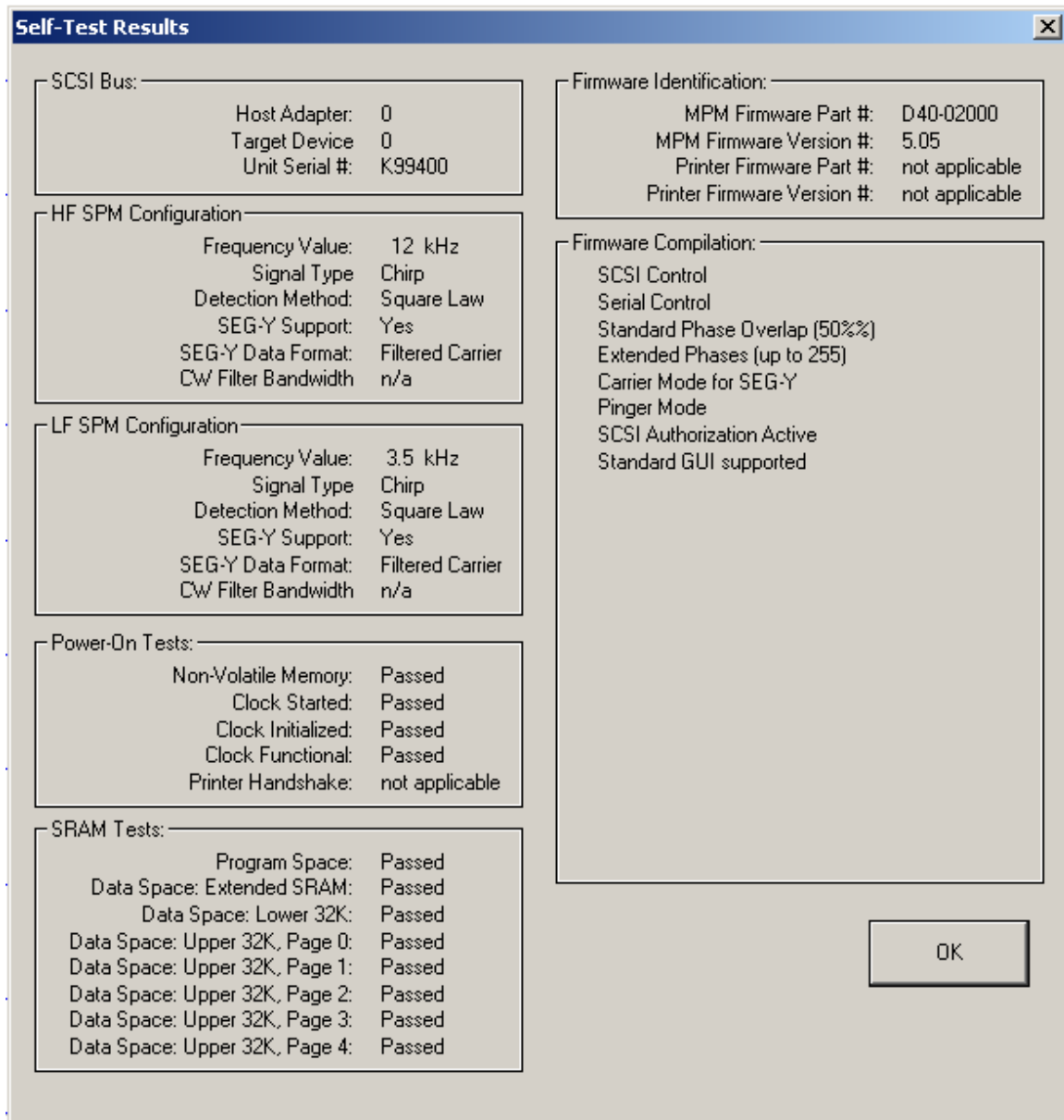
## Starting the Echo Control Software

All control of the echosounder is accomplished using the Echo Control software. Look for the Echo Control icon on the system desktop and open the program.



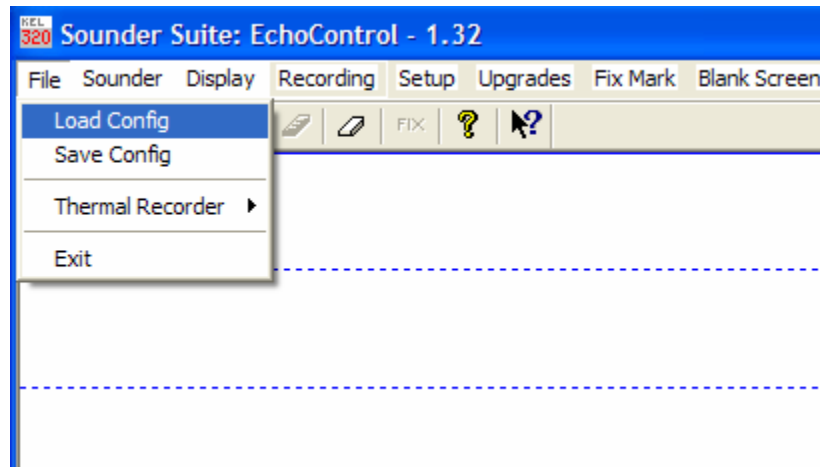
## Power-Up Self Tests

- The Echosounder runs internal tests when powered up. The results are displayed when Echo Control opens.



### Opening a configuration file

- The program will open in the configuration as it was last shut down. To load previously used settings that have been saved click *File* then *Load Config* and choose a file. Display settings are not saved in the configuration file therefore they should be set before each use.



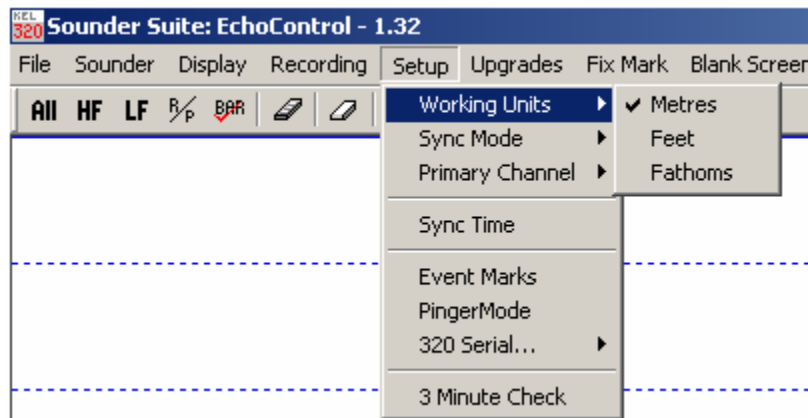
## Echosounder Setup

Use the following sections to set up the sounder for use:

1. Working Units
2. Sync Mode
3. Primary Channel
4. Controls Settings
5. TVG Settings
6. Display Settings

### Working Units

- Working units should be set to meters. Click “Setup” then scroll with the mouse to Working Units then click on “Metres” as shown below.

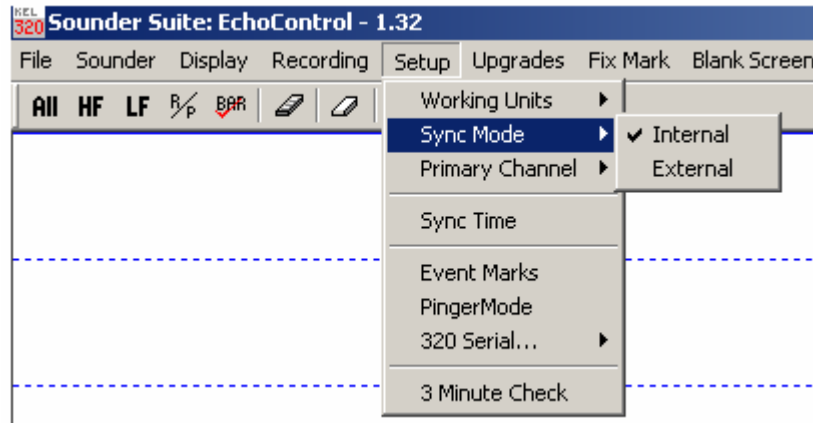


### Sync Mode

- **This is most important to check on the Revelle where there is a sync with the EM120 set up. Data quality will suffer if using the EM120 sync on Revelle but will avoid all possible interference with the multibeam system.**
- The Sync Mode option allows the user to select between the echosounder's own internal timebase-controlled ping cycle synchronization, or an external ping cycle

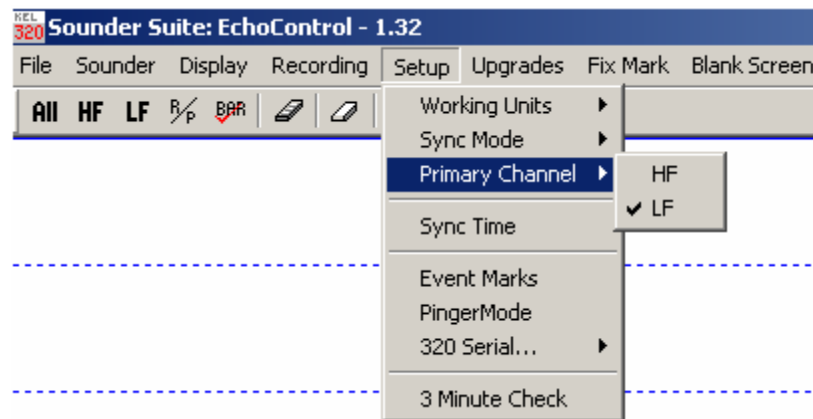
synchronization signal. **WARNING:** If the Sync Mode is toggled to external sync, the echosounder will not ping unless there is an external sync signal fed to the appropriate signal on the sounder.

- Click “Setup” then scroll with the mouse to “Sync Mode” then click on the appropriate setting **usually “Internal”** as shown below.



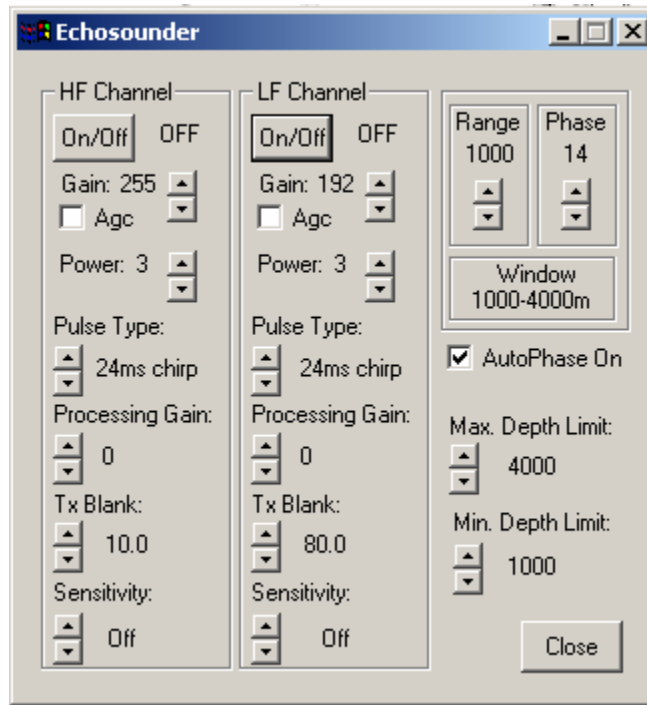
### Primary Channel

- The Primary Channel parameter defines the frequency channel used as the reference depth for the auto phasing algorithm. **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.
- If both channels are being used set the Primary Channel to **HF**.
- To do this click on “Setup” then scroll with the mouse to “Primary Channel” then click on HF as shown below.



### Controls Settings

- The following is an explanation and guide to the controls of the echosounder.
- To open the controls dialog box click “Sounder” then “Controls”, The following dialog box will appear.



#### HF/LF Channels

- The following settings apply to both HF & LF Channels.
  1. On/Off: Clicking on one of these buttons will start corresponding frequency of the echosounder. The display boxes beside the buttons display either OFF or the appropriate digitized depth for the channel. **Turn to On after all settings are confirmed.**
  2. Gain: 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. Start with a setting of **100**
  3. Agc: The Agc selection invokes automatic gain control of the analog receive gain which is **not** the recommended setting for most operating conditions Agc is active when there is a check mark in the check box. Start **unchecked**. **Do not have checked when using TVG.**
  4. Power: The Power parameter is used 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. Begin with a power level of **2 in less than 2000m** of water. Begin with a power of **3 in more than 2000m** of water.

5. Pulse Type: Specifies the pulse length (the duration of the transmit pulse) usually specified in milliseconds. 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. Under some 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 Type selection to meet data rate requirements. When this happens, the Pulse Type parameter value is not changed, and is used again as soon as conditions allow. When the echosounder is overriding the Pulse Type selection, the selection in the control box will change from black text to grayed text. When the selected Pulse Type is no longer overridden by the echosounder, the text will return to solid black.
6. Processing Gain: Provides for additional gain in the digital signal processing software which can be used with very low level signals. It is mainly used for the very low frequency sub-bottom profiling systems (under 10 kHz) where very low amplitude echoes from sub-bottom layers are of interest. The default processing gain value is zero and this should be suitable for almost all conditions. Each level above 0 effectively multiplies the data by a factor of 2. Start with a **setting of 0**.
7. Tx Blank: The Tx Blank parameter sets the transmit blanking distance used by the echosounder's internal digitizer to avoid false triggering on transmit reverberation. Note that transmit blanking has effect only when it extends into the *window*, typically when Phase is 1. A **setting of 10m** is usually sufficient.
8. Sensitivity: The Sensitivity parameter is useful in areas where soft sediments overlay harder materials, and where buried layers may often produce stronger echoes than the real bottom. **Keep set to OFF**.

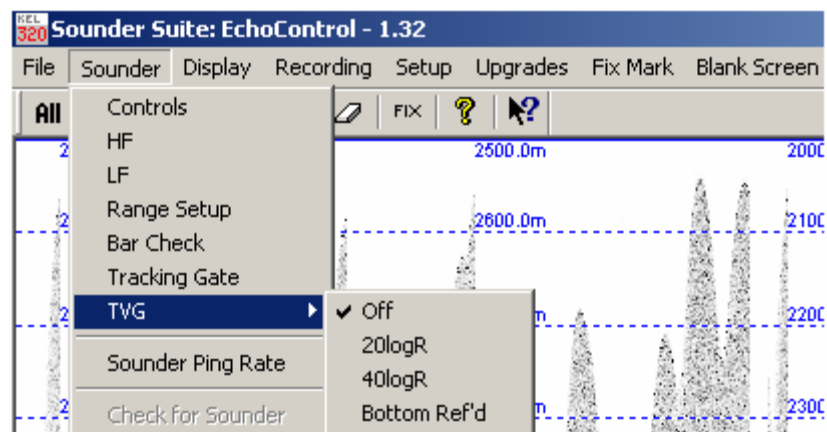
#### Range, Phase, & Autophase Setup

- These settings control the window in which the echosounder *looks* for and displays the bottom. Range and Phase can be set manually, which is sometime necessary when recording in rapidly changing bottom conditions, or automatically.
- The Min & Max Depth Limit setting should always be set for the expected/known conditions or else the echosounder will have trouble tracking the bottom.

1. Range: 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. Nine ranges are available: 10, 20, 50, 100, 200, 500, 1000, 2000 and 5000 meters (or feet or fathoms).
2. Phase: Selects the depth, or location in the water column, of the active *window*. The effect of the Phase parameter depends on the current Range setting. There is a 50% overlap between Phase settings.
3. Window: Is a display of the current combination of Range and Phase selections when being set manually. In auto phase it is a display of the Min & Max Limits.
4. Autophase On: When checked, 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. Begin with **Box Checked**.
5. Max Depth Limit: **Set to the maximum expected/known depth of the operating area.**
6. Min Depth Limit: **Set to the maximum expected/known depth of the operating area.**

### TVG Settings

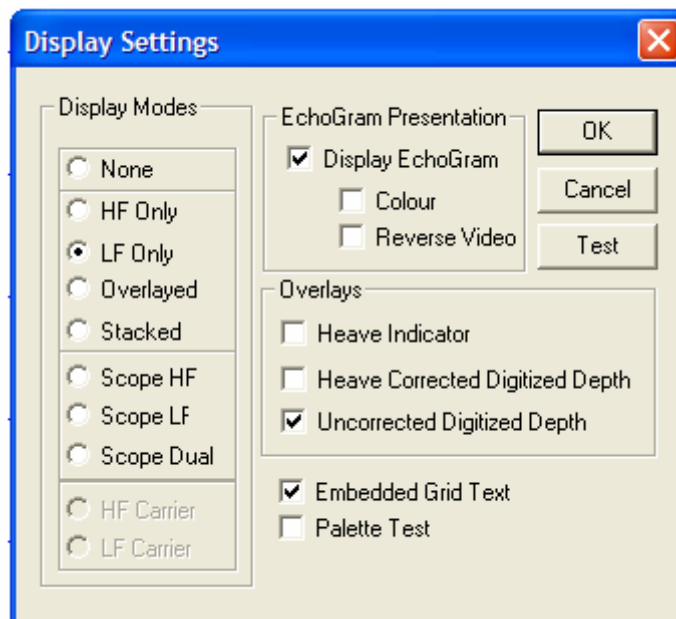
- TVG (Time Varied Gain): Applies gain linearly with time and range.
- TVG is used in conjunction with Manual gain but **should not be used with AGC because the received echo strength varies from ping to ping.**



- To set TVG click “Sounder” then “Controls” then scroll with the mouse to TVG. Select the appropriate setting based on the following:
  1. 20logR: The receive gain is increased linearly (logarithmically if gain is expressed in decibels) with time and range from the instant of transmission, to compensate for signal amplitude loss due to spherical spreading. **Select if using HF (12kHz).**
  2. 40logR: Provides for spherical spreading of both outgoing and returning signals. **Not found to be extremely useful in practice but can be used with HF (12kHz).**
  3. Bottom Ref’d: The bottom referenced setting provides a gain ramp at the bottom (as determined from the previous ping) to provide approximate compensation for attenuation in sub-bottom sediments. **Always use with LF (3.5kHz).**

### Display Settings

- Checking and or setting the display settings will ensure the echogram is displayed properly.
- Click on “Display” then “Settings”. The dialog box shown below will appear.



### Display Modes

1. None: Not Used.
2. HF Only: Check and 12kHz will be displayed.
3. LF Only: Check if 3.5kHz will be displayed.
4. Overlaid: Check and 12kHz & 3.5kHz will be displayed one on top of the other.
5. Stacked: Check and the screen will be split with 12kHz on top and 3.5kHz on the bottom.



6. Scope HF: Provides a graphical presentation for the HF channel similar to an oscilloscope trace.
7. Scope LF: Provides a graphical presentation for the LF channel similar to an oscilloscope trace.
8. Scope Dual: Provides a graphical presentation for both channels similar to an oscilloscope trace, with the HF channel in the top half of the display and the LF in the bottom half.

#### Echogram Presentation

2. Display Echogram: Should always be checked.
3. Colour: When Colour mode is selected (box checked), the envelope data displayed in the program window is in 15 colour levels, mapped from lowest to highest levels as follows: White(normal video) or Black (reverse video), Light Grey, Dark Grey, Cyan, Blue, Dark Blue, Dark Cyan, Dark Green, Dark Yellow, Green, Yellow, Magenta, Dark Magenta, Red, Dark Red. If this item is not checked, the envelope data is displayed in levels of grey, where for normal video mode white is the lowest level return and black is the highest. For reverse video mode, white is the highest level return and black is the lowest.
4. Reverse Video: When Reverse Video mode is selected, the display colors are configured to make black the main background colour. For both colour and grayscale modes, the lowest level return is assigned the colour black. When Reverse Video is not selected (normal mode), the lowest level return is assigned the colour white.

#### Overlays

2. Heave Indicator: Not currently used on SIO vessels.
3. Heave Corrected Digitized Depth: Not currently used on SIO vessels.
4. Uncorrected Digitized Depth: The Uncorrected Digitized Depth option allows the user to enable or disable an overlay that shows the positions of the digitized depth to surface values for each channel displayed. These depth values are the depth to surface values compensated for draft but not heave.
5. Embedded Grid Text: This option allows the user to enable or disable the use of embedded grid text. The current grid scale is always indicated in the block on the right side of the window.
6. Palette Test: The Palette Test option allows the user to test the display capabilities of the host PC system being used. When the Palette Test is selected, for each ping cycle, instead of displaying the echogram data, the application displays a data ramp illustrating the colour or grayscale mapping from the lowest level (starting at the top of the display) to the maximum level.

Ok, Cancel, & Test Button

- The TEST button allows the user to test the selected display settings while the dialogue box is still active without having to exit the dialogue box. If the selected settings are not desired, the original settings can be restored if the user presses the CANCEL button instead of OK.

## Pinger Mode Setup

### Description

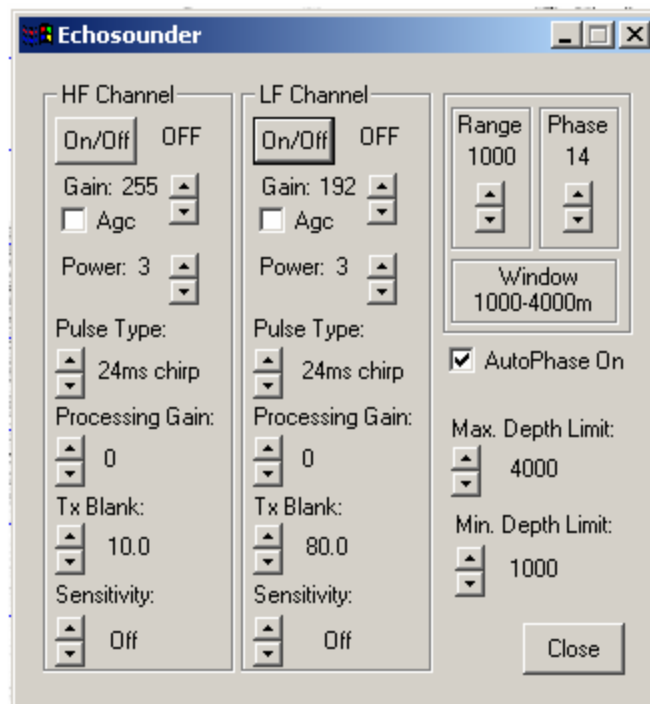
- When the Pinger Mode is on, the echosounder does not transmit at all but simply listens for an external pinger device and displays the received data at the selected interval. The only channel controls that have any effect in Pinger Mode are Manual Gain and Processing Gain.

Use the following Sections to set up the echo sounder for Pinger Mode.

1. Set Controls
2. Turn Agc Off
3. Turn On Pinger Mode
4. Pinger Mode Features

### Set Controls

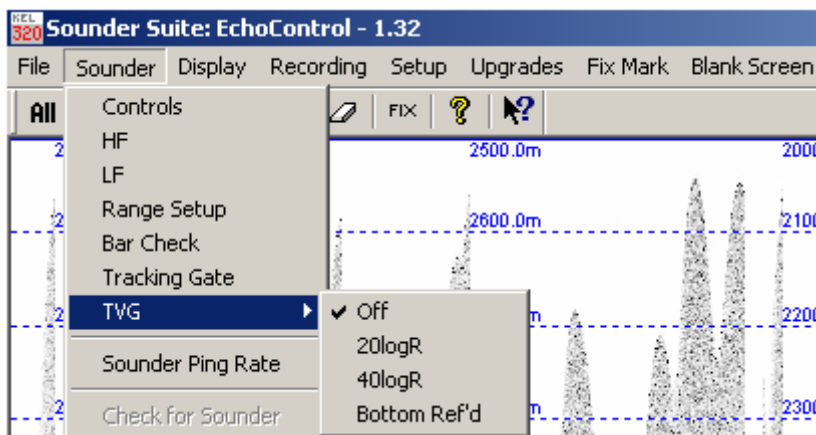
- To open the controls dialog box click “Sounder” then “Controls”, The following dialog box will appear.



1. Set the LF channel to **OFF**.
2. Set the HF channel **ON**.
3. Age should be **OFF (unchecked)**.

### Turn Age Off

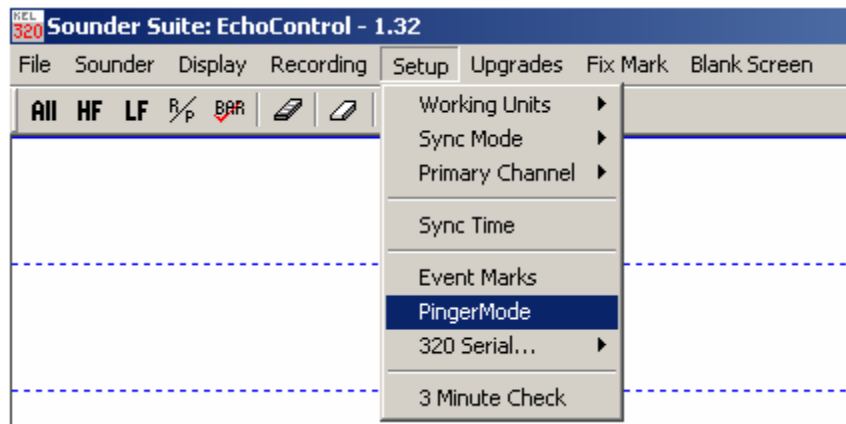
- To set TVG click “Sounder” then “Controls” then scroll with the mouse to TVG. As shown below.



1. Set TVG to **OFF**

### Turn on Pinger Mode

- To turn on pinger mode click on “Settings” then “PingerMode” as shown below.



- The following dialog box will appear. Keep this box open while using Pinger Mode, it will allow the slew function to be used.

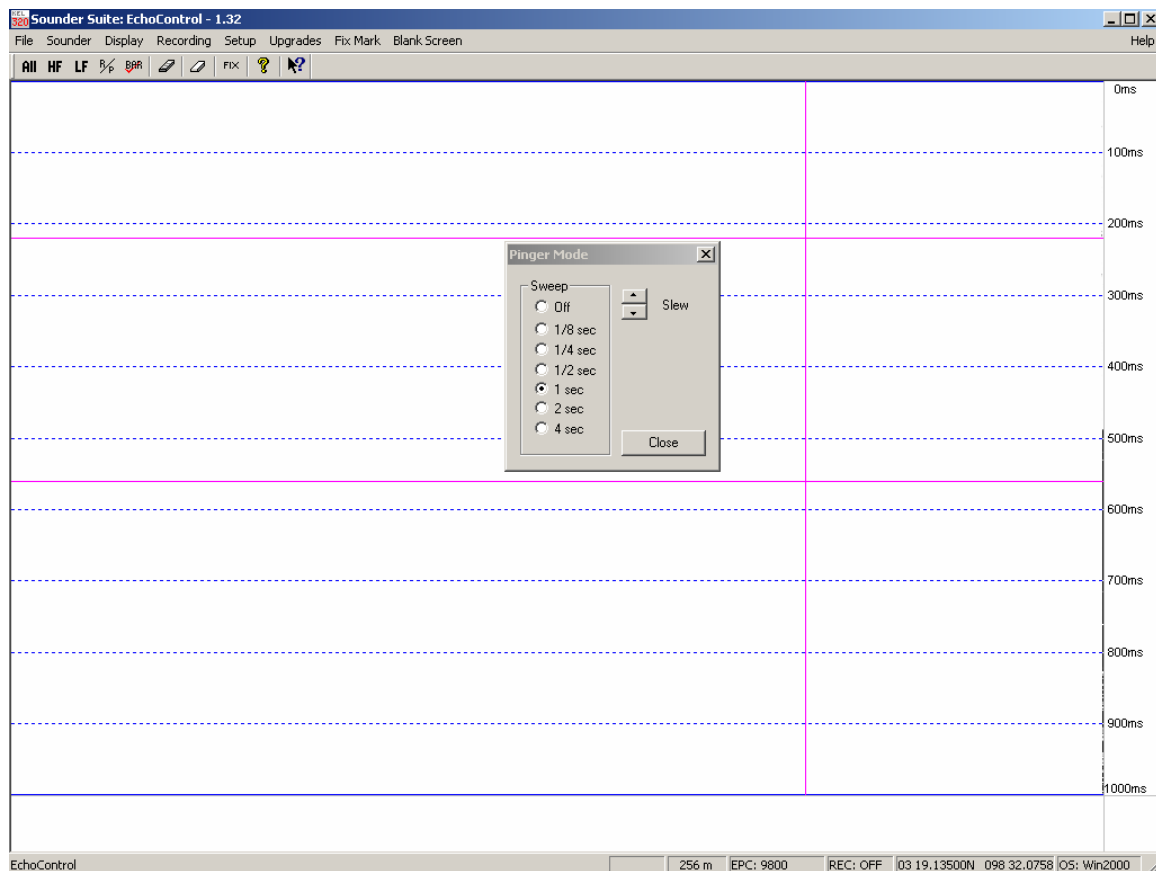


### Pinger Mode Dialog Box

1. Sweep: The rate at which the displayed data is displayed. **Usually set at 1 sec.**
2. Slew: Once the sweep is set a 1 sec window will be displayed on the screen. The slew function will allow for moving the pinger trace to the desired position on the screen.

### Pinger Mode Features

- In pinger mode by using the mouse the distance (given in the set Working Units) can be measured. An example is shown below:



- To use this feature do the following:
  1. Place the mouse arrow on the portion of the direct return trace that is to be measured.
  2. Press and hold the left mouse button. Red crosshair lines will appear.
  3. By dragging the line down to the bottom return a measurement will appear in the center portion of the status.
  4. A double click of the left mouse button will clear the lines for a new measurement

### Making a Hardcopy

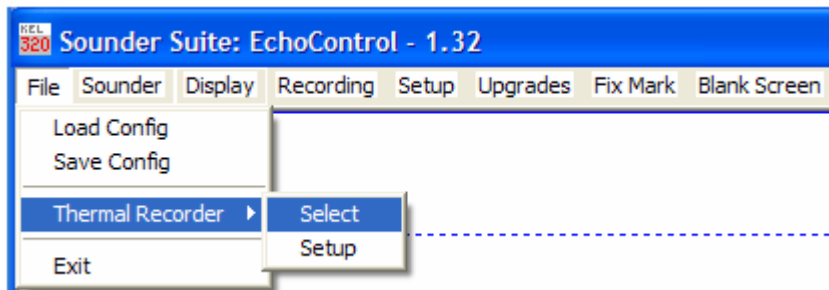
Use the following sections to set up an EPC 9800 series recorder.

1. Select Recorder
2. Setup Recorder
3. Start Hardcopy

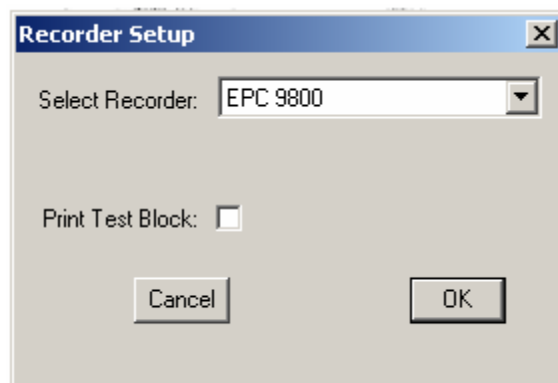
- **WARNING: For a hardcopy to be produced the user logged on must have Administrator privileges.**

#### Select Recorder

- To select the recorder click on “File” then scroll with the mouse to “Thermal Recorder” then click on “Select”.



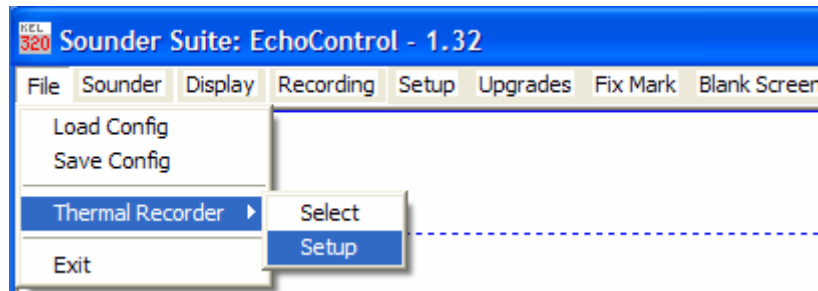
- Then the following dialog box will appear.



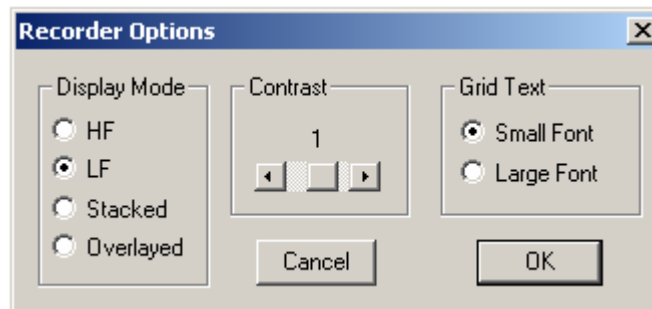
1. If EPC 9800 is selected click “OK”
2. If None is shown, click the arrow in the box and select EPC 9800 the click “OK”.

### Setup Recorder

- To setup the recorder click on “File” then scroll with the mouse to “Thermal Recorder” then click on “Setup”.



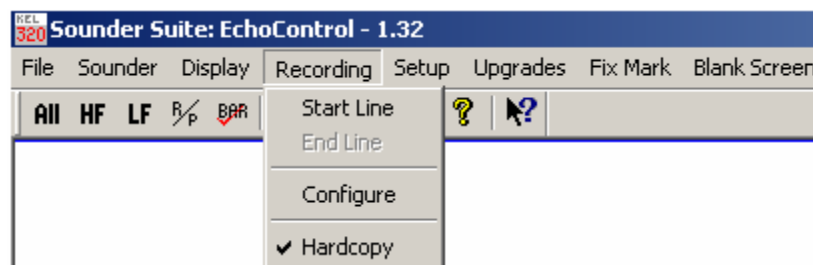
- The following dialog box will appear.



1. Display Mode: Select the frequency to be plotted.
2. Contrast: Select a contrast, **start with 1**, this can be fine tuned later.
3. Grid Text: This will select the font of the depth range values to be printed. **Small Font is suggested but can be changed once plotting.**
4. Click “OK”

### Start Hardcopy

- To start hardcopy click on “Recording” then “Hardcopy”. When a *check mark* appears recording should begin.



## Recording Digital Data

### Description

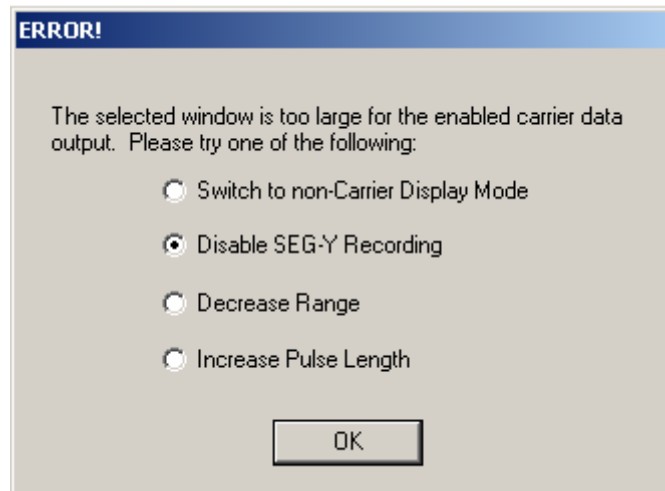
Echo Control allows digital data to be recorded in 3 formats. The formats are Binary (.keb), SEG-Y (.sgy), and ASCII (.kea). When digital data is important to the science party it is best to record **both Binary and SEG-Y formats**.

### Binary Format (.keb)

Data recorded in this format can be viewed using KEL Post Survey Software. This software will soon be freely available from [www.knudsenengineering.com](http://www.knudsenengineering.com). The data recorded in this format is envelope detected.

### SEG-Y (.sgy)

Data recorded in this format can be viewed using KEL Post Survey software. The data recorded in this format is carrier detected. Depending on conditions SEG-Y recording can require more attention from the user. It is not recommended to use Autophase Mode when recording SEG-Y data. **Warning: The carrier buffer can be exceeded depending on pulse length and window size. The system will give the following warning.**

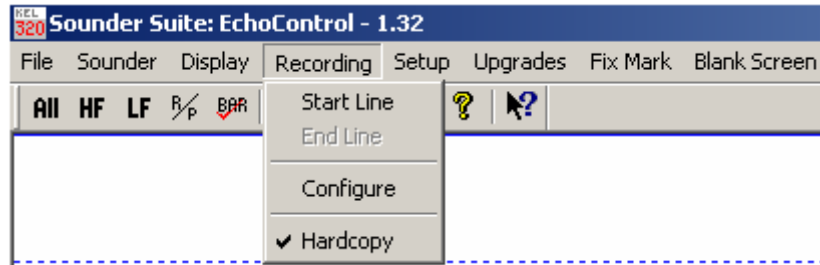


The most likely possibilities for this message are:

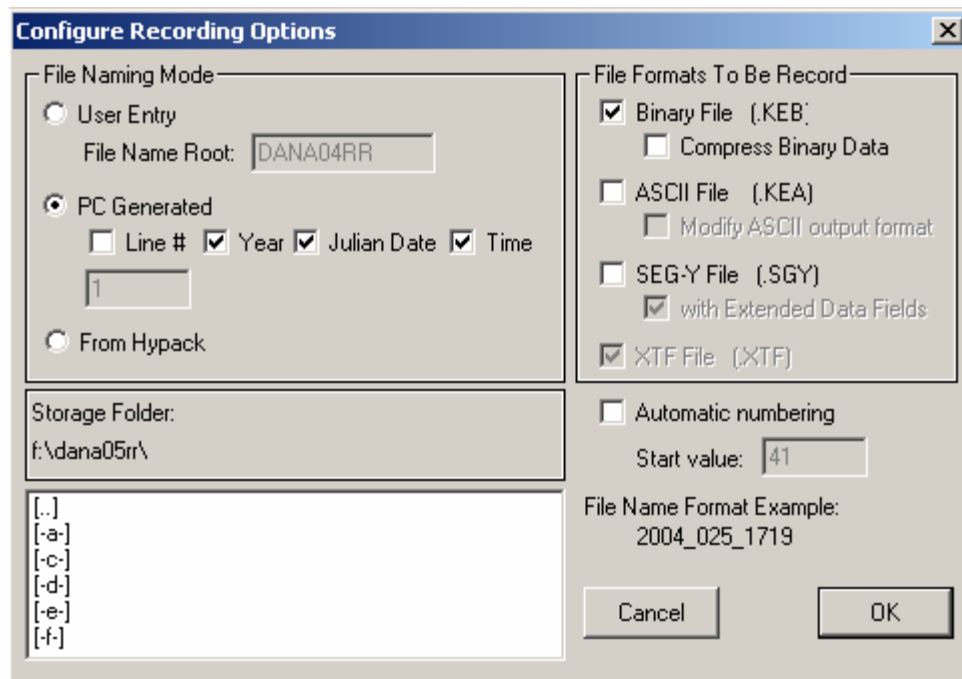
1. The system is searching for the bottom in Autophase Mode. Disable SEG-Y recording, find the bottom and then enable SEG-Y recording again. The user will have to stand watch and manually change phase over rough terrain.
2. The Range is too large for the carrier buffer. Decrease Range.

## Configuring Recording

- Click on Recording then configure as shown below:



- The following Dialog box will appear:



### File Naming Mode

- User Entry: When checked the user can enter in a file name. This selection can be used with automatic numbering.
- PC Generated: Check the appropriate boxes for this type of recording.  
**The preferred way to handle file naming.**
- From Hypack: Not Used

### File Formats to be Recorded

- Binary File: Check to record Binary data. Compress binary data can be checked if necessary.
- Ascii File: Check to record ascii depth data. Check Modify ASCII output format to bring up a dialog box which allows the user to modify the format.
- SEG-Y File: Check to record SEG-Y data. Checking extended data fields is recommended.



# **Ship Specific Installation Information**

## **R/V Revelle**

### **Transducers**

The Revelle has two 12 kHz EDO 323B transducers mounted in the Hull. Both are in the same general location fore and aft. They are identified as Port 12kHz and Stbd. 12kHz. There is also an array of 16 3.5 kHz Massa transducers mounted in the hull. For more detailed information on the exact location please contact [lee@odf.ucsd.edu](mailto:lee@odf.ucsd.edu).

### **Connections**

The Port 12kHz, Stbd. 12kHz, and 3.5kHz cables are terminated with Amphenol connectors (MS3106A-14S-7P). From there jumpers are attached to connect the echosounder. The following jumpers are available on Revelle.

- 2 Amphenol (MS3101A-14S-7S) to LEMO connectors –for Knudsen
- 1 Amphenol (MS3101A-14S-7S) to Amphenol (MS3106A-16S-7P) –for Bathy-2000
- 2 Amphenol (MS3101A-14S-7S) to tinned wire – pigtails for optional transducer connections.

### **Important Please Note:**

Revelle has a sync run from the EM120. What this means is that the EM120 will send the echosounder a contact closure which tells the Knudsen to ping in sync with the multibeam. The result is no possible 3.5kHz interference in the multibeam data. The down side is echosounder performance suffers especially in water >1000m. It is recommended to keep it unplugged unless it is requested by science to avoid an unwanted sync with the EM120. The software setup is discussed in the “Echosounder Setup” section.

## **Instructions For Transducer Connection on R/V Revelle**

### **Notes:**

- **Refer to Transducer Connection Diagram**
- **Do not operate echosounders without transducers connected!**
- **Be sure to connect transducers to the correct input on the echosounder to be used.**

### **To Connect the Knudsen 320B/R**

#### **High Frequency (12kHz)**

1. Select and locate the desired 12kHz Amphenol Connector from the transducer. (port or stbd)
2. Locate the HF 12kHz Amphenol Connector from the Knudsen
3. Connect and tighten finger tight.

### **Low Frequency (3.5kHz)**

1. Locate the Amphenol Connector from the 3.5kHz transducer.
2. Locate the LF 3.5kHz Amphenol Connector from the Knudsen
3. Connect and tighten finger tight.

### **To Connect the ODEC Bathy-2000**

### **High Frequency (12kHz)**

1. Select and locate the desired 12kHz Amphenol Connector from the transducer.  
(port or stbd)
2. Locate the HF 12kHz Amphenol Connector from the ODEC.
3. Connect and tighten finger tight.

### **Low Frequency**

1. Locate the Amphenol Connector from the 3.5kHz transducer
2. Locate the 3.5 kHz Amphenol Receptacle on the ODEC echosounder.
3. Connect and tighten finger tight.

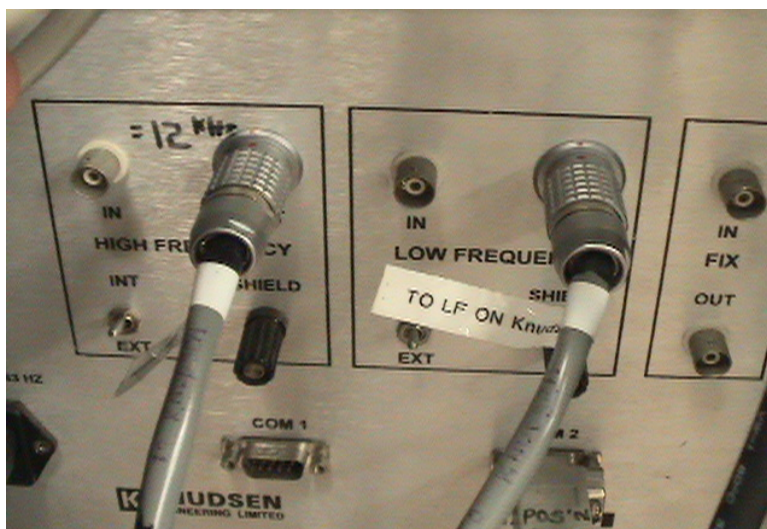
### **Revelle Knudsen 320 B/R Installation Pictures**



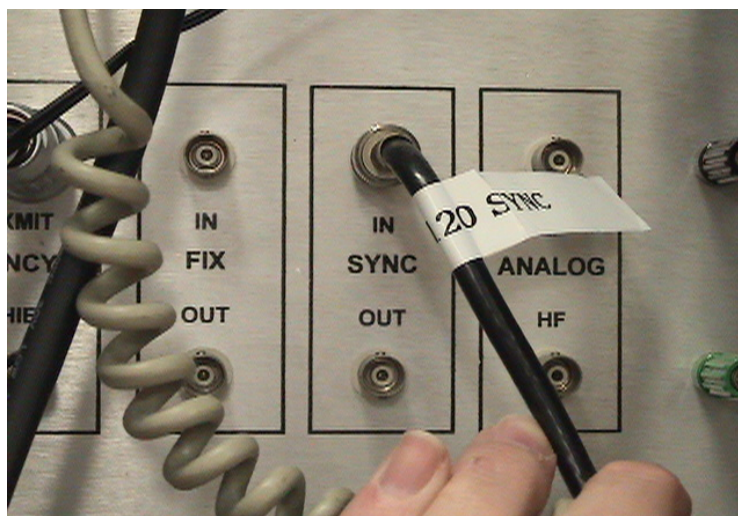
**View of Echosounder and Keyboard**



**Amphenol Transducer Connectors**



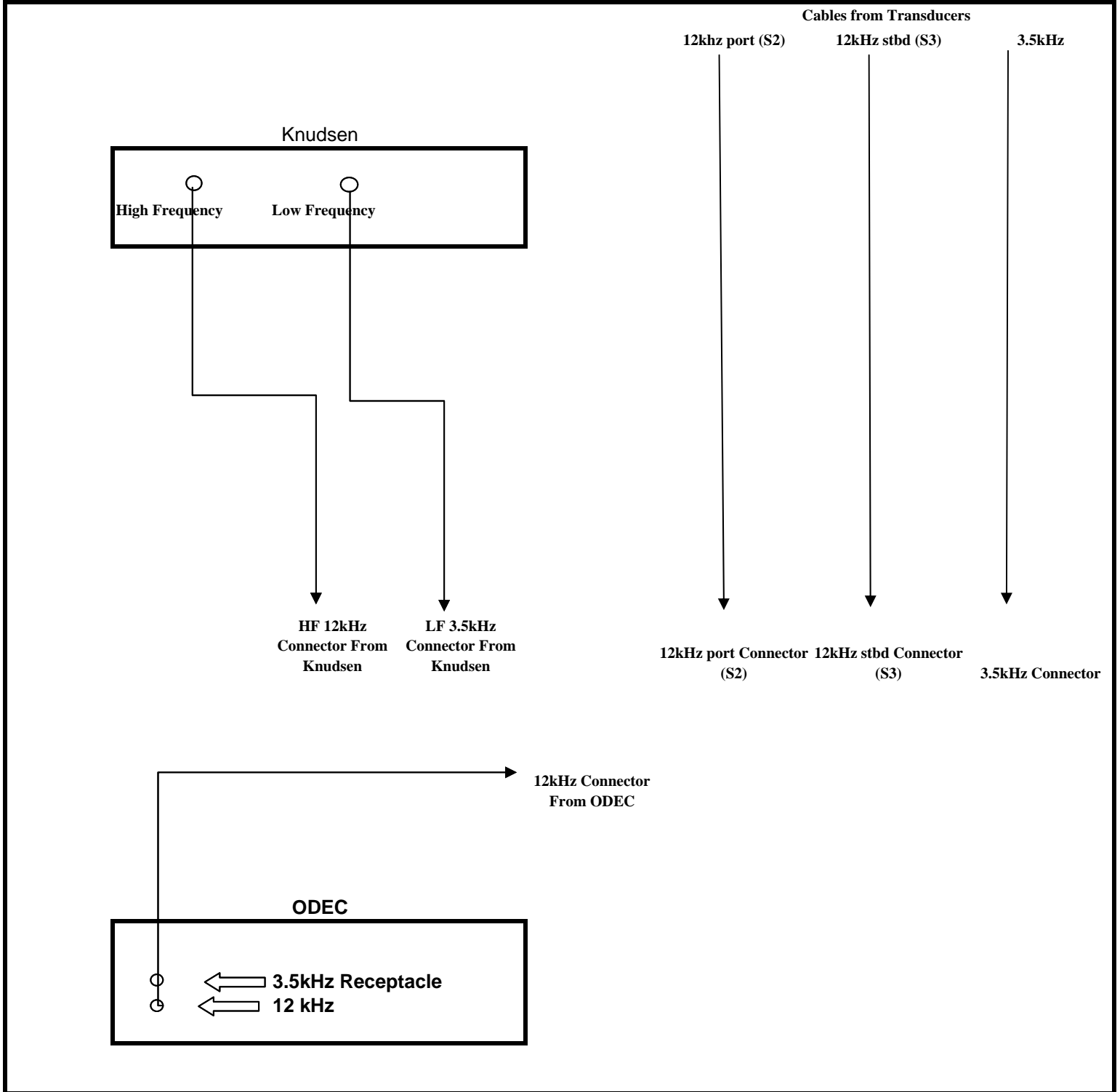
**Echosounder Back Panel Transducer Connectors**



**Back Panel EM 120 Sync Connection**

# Revelle Tranducer Connections Diagram

Note: Orientation is Facing The back of the Echosounder Rack  
All Connectors Are Labeled  
Top of Rack



Bottom of Rack

**R/V Melville**

**Coming Soon !!!**

**R/V New Horizon**

**Coming Soon!!!**

**R/V Sproul**

**Coming Soon!!!**

**Troubleshooting**

**Coming Soon!!!**