Underway Geophysics Lab Cookbook
## UNDERWAY LAB START-UP PROCEDURES
FOR TRANSITS
January 2002

These start-up instructions are for Lab Officers/Assistant Lab Officers/Senior Techs when the Underway Tech is off-duty. Before going off-duty, the Underway Tech should provide you with the following:

a) A new transit number [e.g. L7T (Line 7 Trans it)]
b) An updated Excel depth log (e.g. depth199.xls) on the WinFrog 2 desktop
c) An adequate supply of transit log sheets on a clipboard
d) The starting depth range for the 3.5kHz recorder
e) The magnetometer value in gammas from the end of last transit
f) A file name for the transit data collection on WinFrog
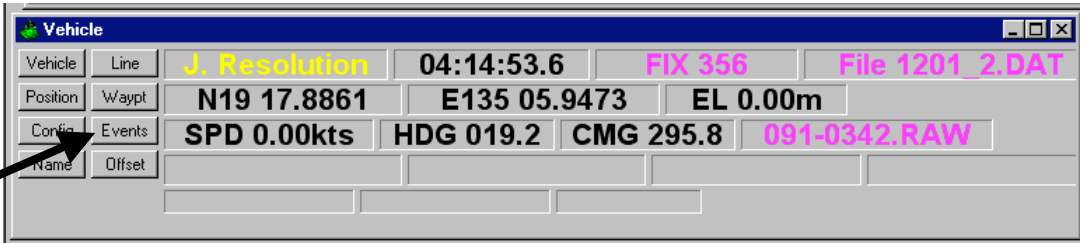
Start Data Collection for a Transit

1. To start a new event for a transit or at a hole, first stop current event recording by clicking on the red button at the top of the screen.
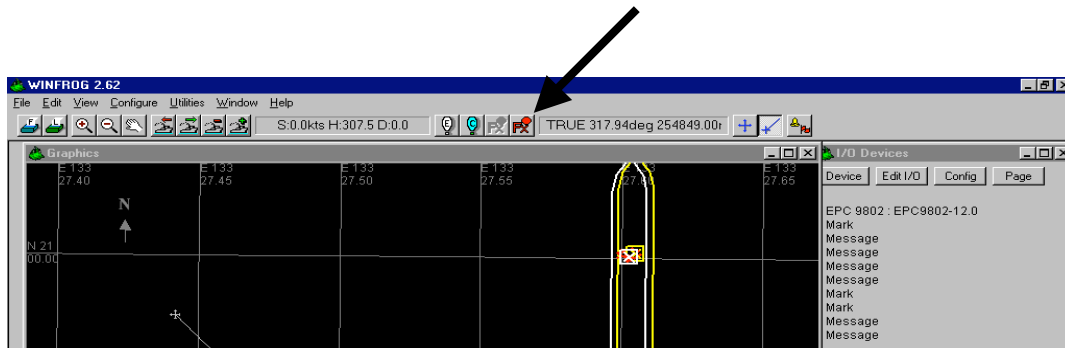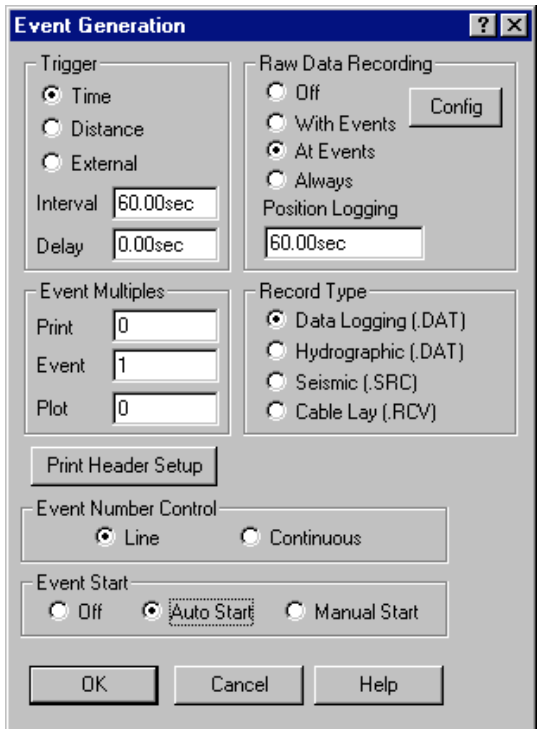

The Data Logging screen will appear. Click Ok, then yes and yes.
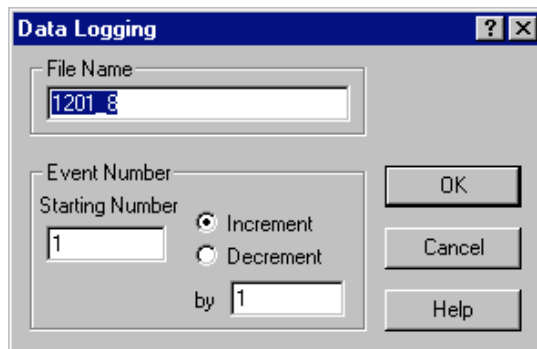
Next click on the Events button in the Vehicle window in the lower part of the screen.

The Event Generation window will appear. For transits and on-site, select Time as the trigger and an interval of 60.00 sec. Set Raw Data Recording At Events and Event Start to Auto Start. Click OK.
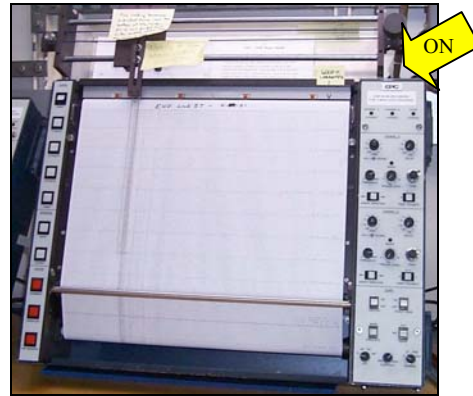

The Data Logging Screen will appear. Name the transit or on site event (e.g. L4T or Line 4 Transit, or 1200A or Site 1200, third on-site data collection). Click OK. New .raw and .dat files will appear (in purple) in the vehicle window.
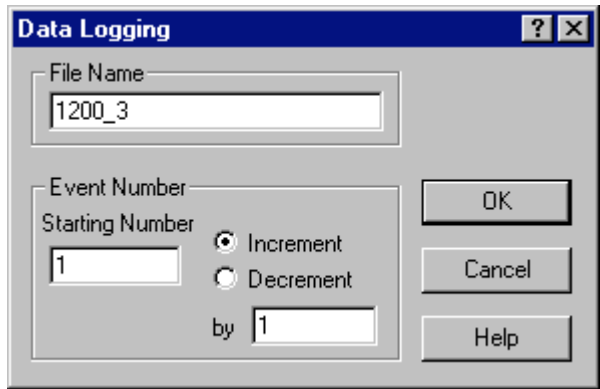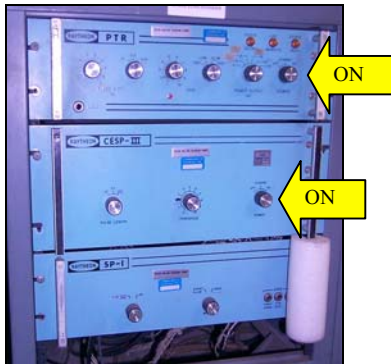
2. Turn on the two Raytheon echosounders and the 3.5 and 12.0 kHz EPC recorders.
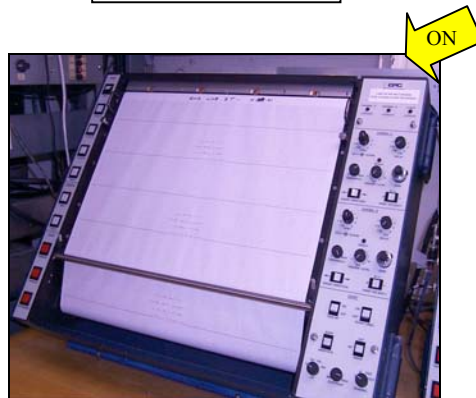

Raytheon 3.5 Echo Sounder

3.5 EPC Recorder

Raytheon 12.0 Echo Sounder

12.0 EPC Recorder

3. Hand annotate the start of each EPC recorder roll with the following information:

START Line # (e.g. L7T)
Leg #
Julian Date, GMT
Recorder Name (e.g. 3.5kHz)
Range

4. Click on the UW Watch Program icon on the WinFrog 2 desktop. If the program is already running, go to the top left of the UW Watch screen and select "initialize". Initialization of all devices will run.


5. Labview will load and the UW Watch Program will present the INIT screen (below). Fill in the numbers as required. The leg should already be filled in and the UW tech should have provided you with the new Transit Number (AKA Line ID number). Click OK.
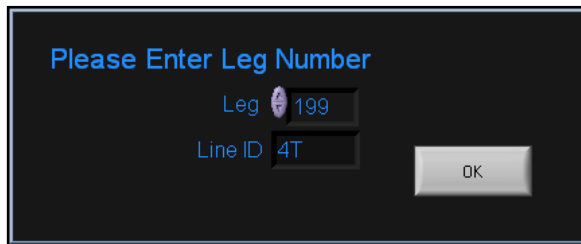

Initialization of all devices will start as the UW Watch Program begins to look for the data stream from the GPS, the gyrocompass and the magnetometer. Typically the magnetometer will not be in the water at the start of a transit, so you can expect the UW Watch Program to give you a message that initialization for the magnetometer failed. Just say "ok". You will run the initialization procedure again when the magnetometer is fully deployed and powered on. Finally, the program will check to see if both the 3.5 and 12 kHz EPC recorders are on. Once the recorders are detected, the UW Watch application will open.

6. Select the 12.0 PDR tab and click on the "Depth Check" button as in the example below.
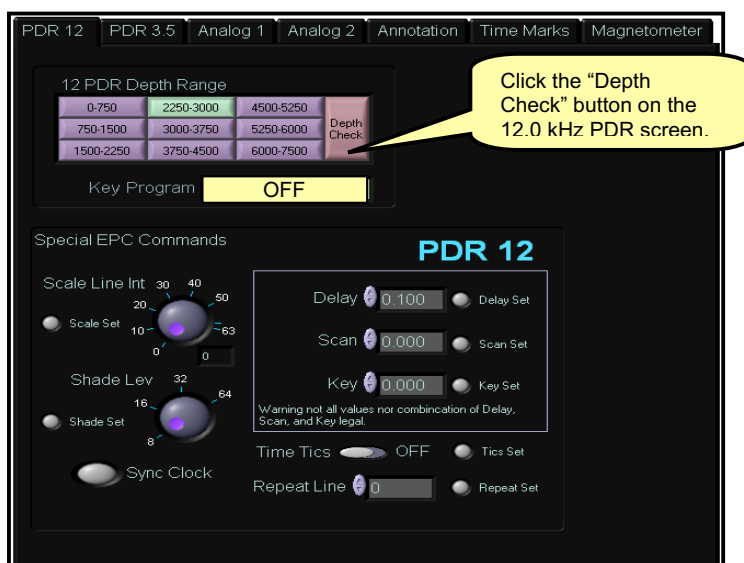
7. Then select the 3.5 PDR tab and click the current depth range button (e.g. 2250-3000).
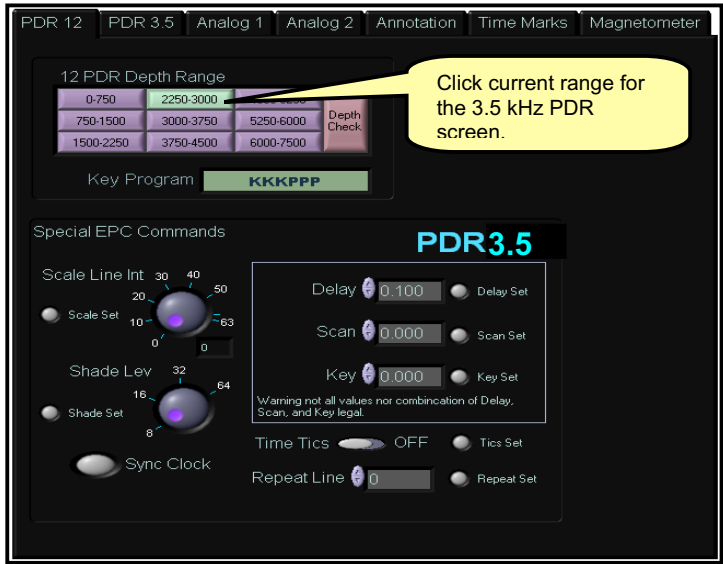
8. Next go to the Annotation tab. Click on the Annotate button for both the 3.5 and 12 PDRs. This will "annotate" each EPC recorder with "scan" and "delay". Wait a few minutes before going over to the recorder to read the annotation.
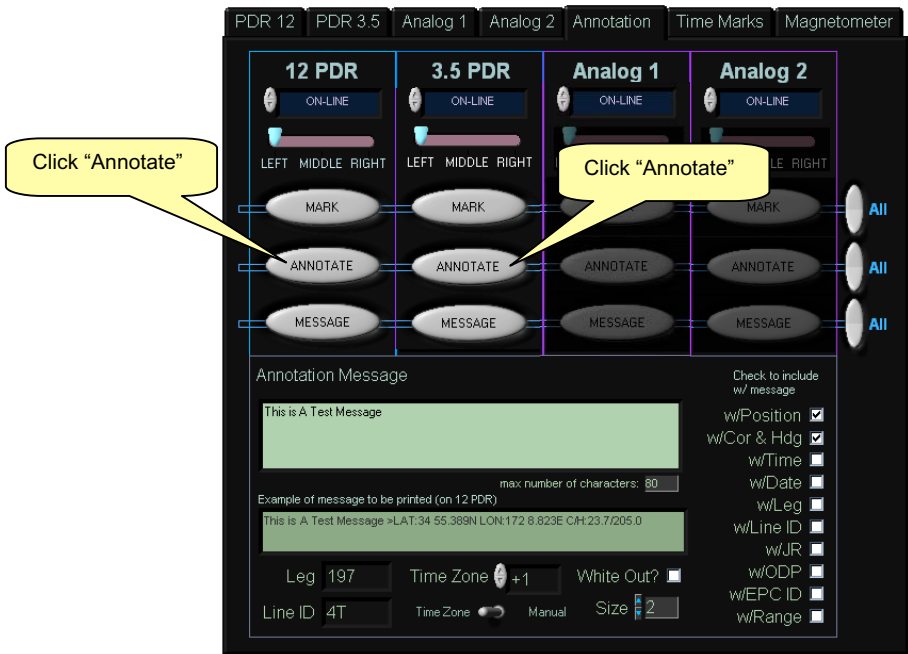
The annotation on the **3.5kHz** should display *scan = 1000ms and delay = 100ms*. In Depth Check mode, the **12.0 kHz** should show *scan = 8000ms and delay =100ms*. If this is not the case, go to the *Troubleshooting* section at the end of this manual.

9. Before deploying the magnetometer, call the bridge to get the ok. If the ship is up to speed and the bridge gives the ok, deploy the magnetometer. Be sure to shut off the maggie winch breaker/switch box on the fantail when the maggie is fully out. Come back into the lab and turn the power switch on and then flip the toggle (above the power switch) to either the port or starboard magnetometer depending on which one is in use.
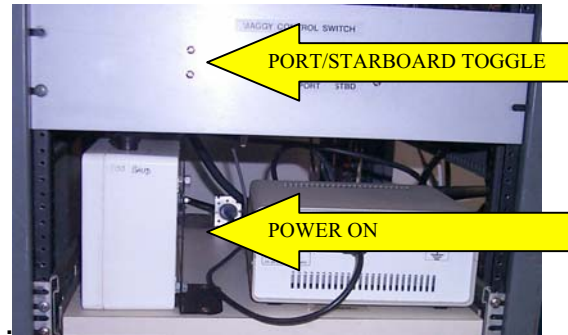

10. The magnetometer needs to be "tuned" before good data is collected. Tuning is controlled by the WinFrog software on WinFrog1. The tuning value should have been given to you by the UW tech before he/she is off duty. If for some reason you need to figure out what the tuning value should be, skip to *Troubleshooting* at the end of this manual.

To tune, go to I/O devices in the upper right part of the screen on WinFrog1. Scroll to Magnetometer Geometrics 886. Click on the Config button.
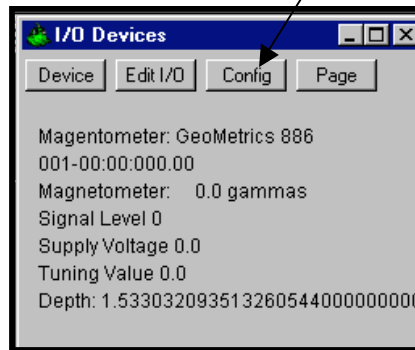
The Geometrics 886 configuration window appears. Leave Cycle time at 3.0. Select Manual Tuning. In the Manual window type in approximately 2-5 units higher than the number of gammas that the UW tech gave you (divided by 1000).


Type number of K gammas here.
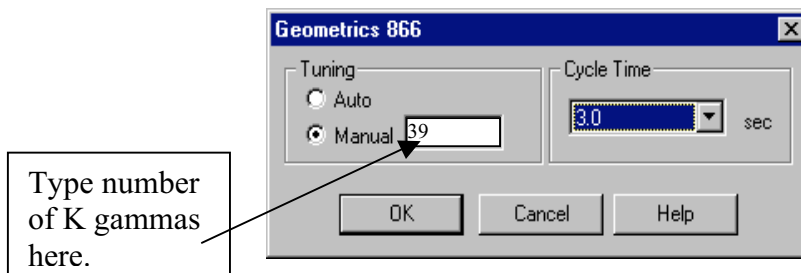
Go to the I/O Devices screen again. Your signal value should be in the vicinity of 200. If not, go back into Config and change the tuning by increasing the number (up to 5 units) in an attempt to optimize the signal. Click OK and wait a few seconds to see if the signal level changes.
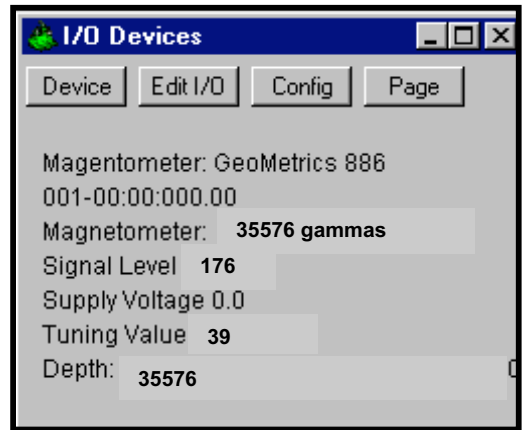
You should see a plot appear in the bottom right calculations window in WinFrog1.

11. Before you see the plot of magnetometer values in the UW Watch Program on WinFrog2, you will need to reinitialize the application by going to the top left of the UW Watch screen and selecting "initialize". Initialization of all devices will run. The magnetometer should now be detected. Select the magnetometer tab. You should also see a plot of the new maggie values appear on the right side of the screen.

Keep Time and Field locked to enable tracking of the magnetometer signal at all times.
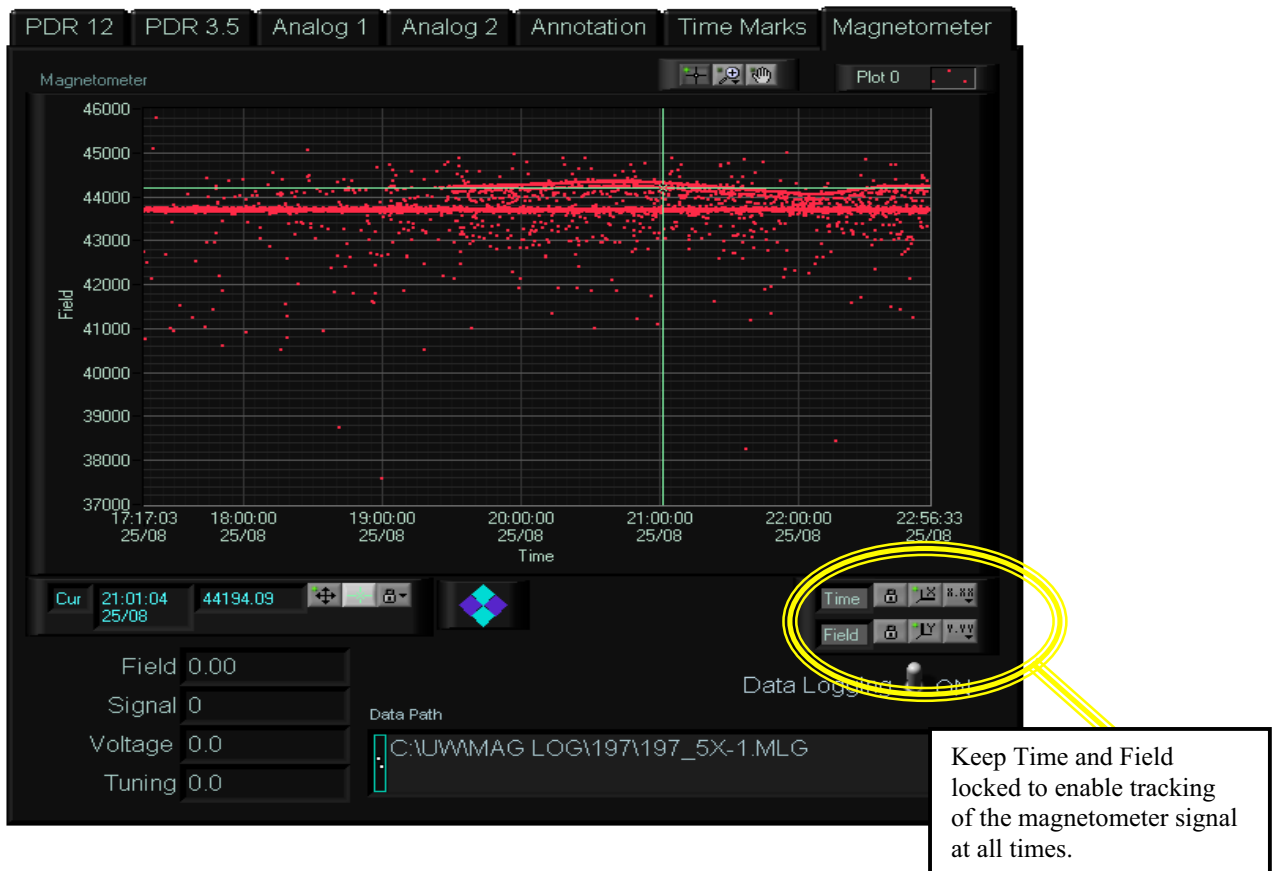
12. Reinitialization will change the settings on the 12.0 kHz recorder by taking it out of Depth Check mode and putting in the current range. To fix this, click on the Depth Check button again and then annotate to be sure the delay is 100ms. If this doesn't reset the delay, go to *Troubleshooting* .

> Click the "Depth Check" button on the 12.0 kHz PDR screen.

> Click "Annotate"
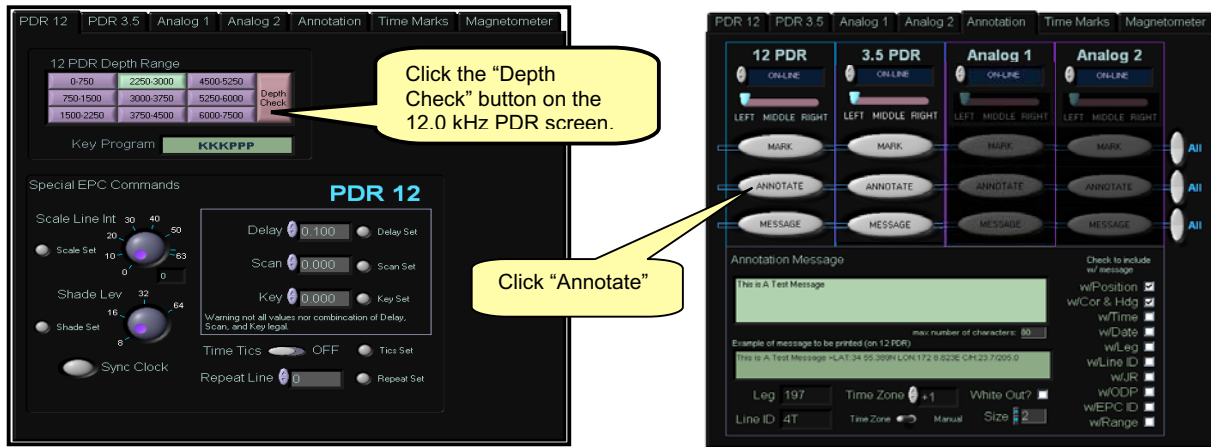
Troubleshooting

- **Delay is not 100ms upon start-up or after reinitialization of UW Watch Program.**

Sometimes upon start-up or after reinitialization (e.g. after the maggie is turned on) the delay on the 3.5kHz and/or the 12.0kHz recorders is not 100ms. To set/reset, click on the Depth Check button. Annotate the records to make sure the delay is set correctly. If the delay is successfully set to 100ms, return to the current depth range. On the other hand, the delay is not reset to 100ms, try switching the recorders on and off (see Bill's instructions below) or try reinitializing all devices again in the UW Watch Program.


> Click on "Depth Check" reset the 100ms delay.
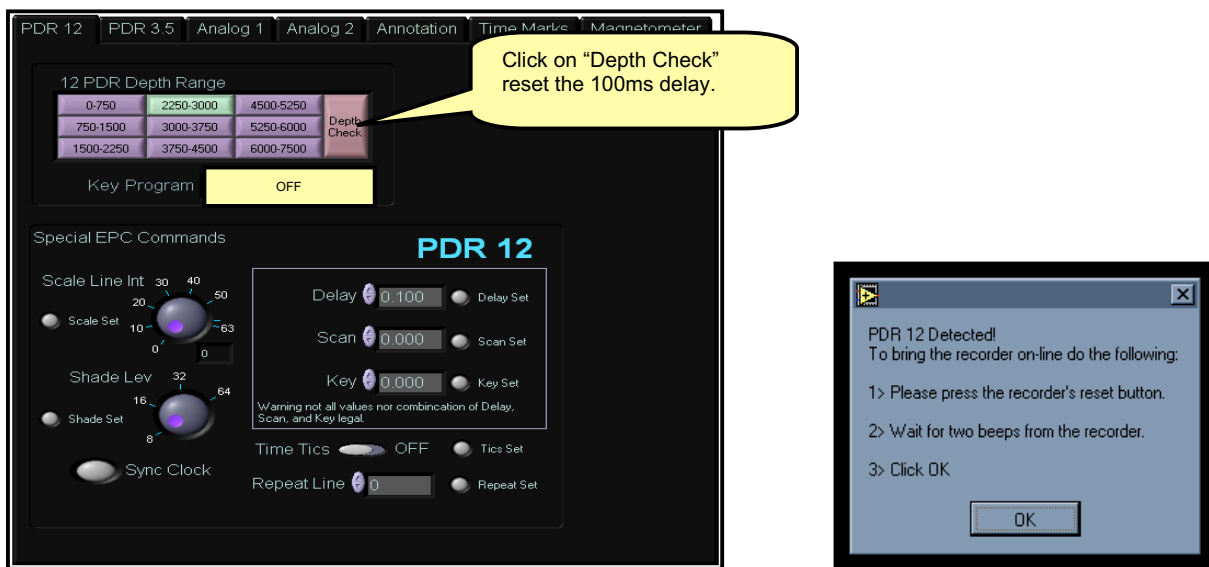
Note about turning the EPC recorders on and off: The recorders can be turned on or off at anytime while the program is running. The UW Watch Program constantly checks for any new EPC recorders on the GPIB (General Purpose Interface Bus). When UW sees that a recorder has powered up it will display a warning (see left inset). Make sure that you follow the instructions in the dialog box; otherwise, the GPIB interface on the recorder will lock up an you will get a lot of error messages anytime UW sends a command to the EPC recorder.

If you continue to see error messages, press the recorder's reset button (on the upper top left corner of recorder). This should clear up the problem. If you continue to have problems re-initialize the UW application. …*from Bill's UW Watch Manual*

- **Setting the correct magnetometer tuning value and maximum signal level on the magnetometer.**

Data from magnetometers can be used to describe characteristics of the geologic structure of the earth. The unit of measure to express the intensity of the earth's magnetic field is the gamma (1 gamma equals 10^{-5} gauss or 10^{-9} tesla or 1 nanotesla). Depending on where you taking measurements, the earth's magnetic field can range in intensity from 20,000 to 70,000 gammas.

To tune the magnetometer effectively, you need an idea of what the earth's magnetic field is for your current Latitude and Longitude. There is a large map of the earth's fields stored in the map drawers in the UW lab. An example of the magnetics map appears below.
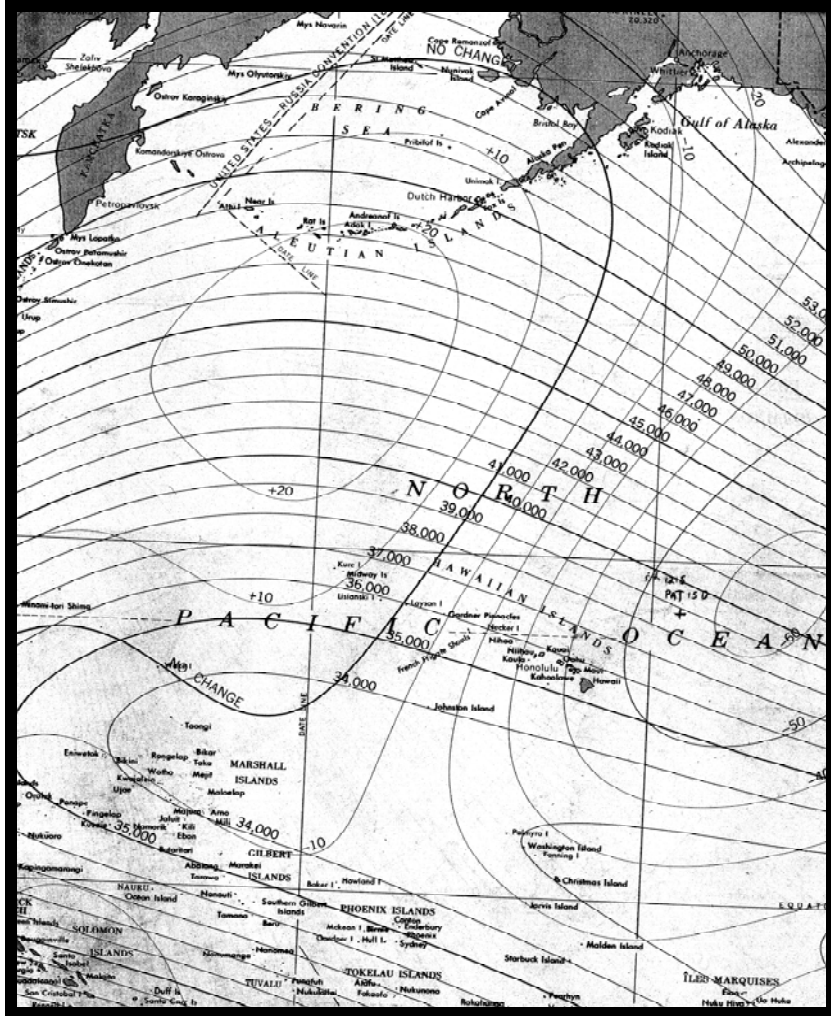
To determine what range you are in, plot your Latitude and Longitude on the map. Note what the range of fields (the purple isopachs) is for your location. For instance, if you are just east of the island of Hawaii the magnetics range will be 35,000-36,000 gammas.

Once you know the magnetics range for your position, go to WinFrog1 to tune the magnetometer. To reiterate instructions from an earlier section in this manual, to tune, go to I/O devices in the upper right part of the screen on WinFrog1. Scroll to Magnetometer Geometrics 886. Click on the Config button.
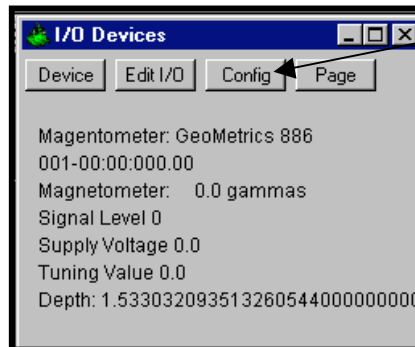
In the Manual window of the Geometrics 866 screen, type the number of gammas from the magnetics map (divided by 1000). For the 35,000 to 36,000 gamma range for the Hawaii area, insert a value of something between 35-39 (approximately 2-5 above the earth's magnetic field for this area).
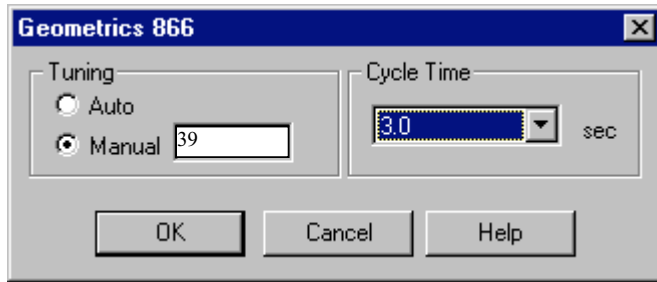
Click ok. Go to the I/O Devices screen. Your signal value should change. Ideally you want it to be in the vicinity of 200. If not, go back into Config and change the tuning by adding or subtracting a value of up to 5 in an attempt to optimize the signal. Click OK and wait a few seconds to see if the signal level changes.
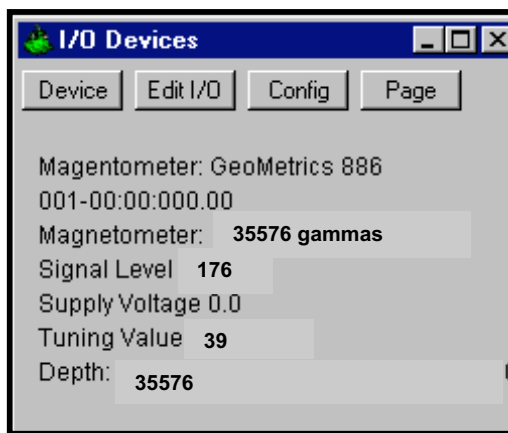
A too high tuning value can increase or decrease the signal level. A too low tuning will decrease the signal. Even though you should aim to have a value of ~ 200 at maximum tune, realize that this can vary with ambient field strength (signal amplitude is proportional to field strength, i.e., we would expect half the signal strength value in a 25,000 gamma field compared to a 50,000 gamma field), sensor orientation (you will get more signal going north-south than east-west) and gradients (you will not get a usable signal with the sensor on a steel deck due to high magnetic field gradient). In short, it's best to experiment with different tuning values to try to optimize the signal level.