Underway Geophysics Lab Cookbook
User's Guide to the Underway Watch Application
As of Leg 199, December 2001

Introduction

The Underway Watch (UW) application provides full time mark annotation control of all four EPC recorders. Using data collected from our GPS receivers (Ashtech or Omnistar) and the gyrocompass repeater, UW will time mark the EPC records at 5-min, 30-min, and 4-hour intervals.

In addition to time mark annotation, the UW application provides the following:

- You can set the PDR's depth program to any rang including "Depth Check" mode.
- You can mark, annotate, or print user's messages to individual or to all EPC recorders at the same time.
- You can access special EPC commands not provided on the recorders control panel.
- You can collect, display, and log magnetometer data.

Setup

The UW application runs on the backup WinFrog PC (WinFrog #2). Special "Y" connectors (multi-color ribbon cables) allows UW to monitor (but not control) the serial data stream to WinFrog #1 from the gyrocompass, Omnistar GPS receiver, and the magnetometer. The ends of the "Y" connectors are plugged into the WinFrog #1 & #2 DigiBoard connector block while the data input is connected to the center plug. UW uses Port "C" of the Ashtech GPS receiver leaving Port "B" for Winfrog #1. The default serial port configuration for both WinFrog #1 & #2 as follows:

Port #	Interface	WinFrog #1	WinFrog #2 (**Underway Watch**)
COM 1	**PC**	**Serial mouse**	Uses bus mouse
COM 2	PC	Not Used	Not used
COM 3	**DigiBoard**	**Omnistar GPS**	**Omnistar GPS**
COM 4	**DigiBoard**	**Gyro compass**	**Gyro compass**
COM 5	**DigiBoard**	**Ashtech GPS port "B"**	**Ashtech GPS port "C"**
COM 6	DigiBoard	Not used	Not used
COM 7	DigiBoard	Not used	Not used
COM 8	**DigiBoard**	**Magnetometer**	**Magnetometer**
COM 9	DigiBoard	Not used	Not used
COM 10	DigiBoard	Not used	Not used

Control of the EPC recorders is done over GPIB (General Purpose Interface Bus, sometimes known as HPIB). A national instrument GPIB board is installed in WinFrog #2 and single cable connects all four EPC recorders to the PC. Each of the EPC recorders must have a unique GPIB address, which is set by setting the DIP switches on the left side of each recorder. Instructions on how to set these switches can be found in the EPC manuals, but once set they should really never change.

The UW application takes advantage of the unique GPIB addresses to identify the function of each recorder. **What this means is that you can't just set the GPIB address to any unique value! You must use the values shown to the right. →**

For example: The EPC recorder used for the collection of 3.5 kHz data breaks down and you want to use the Analog #1 EPC recorder in its place. To have UW to recognize the new EPC recorder as the 3.5 PDR, you must change its address from 8 to 4. Remember to cycle the power on the recorder after resetting the GPIB address and re-start the program.

Getting Started
The UW application is a LabView 6.02 executable library. **You must have LabView 6.02 (or higher version) installed on the PC for UW to run.** A shortcut to the library should be on the desktop and in the start menu. Double-click on the shortcut icon.


The LabView window will open the library will be loaded. Once loaded the UW application will being its initialization functions.

Under normal circumstances the UW application will begin initialization by reading its setup file which contain the operating parameters in use when the program closed. When running UW for the first time (or the setup file has been deleted for some reason) you will receive a warning that the setup file was not found. Next the *U/W Watch Init* control panel will open. From this control panel you can set all of the connection parameters and test EPC control. How to use this control panel is discussed in the *Initializing U/W Watch* section of this manual.
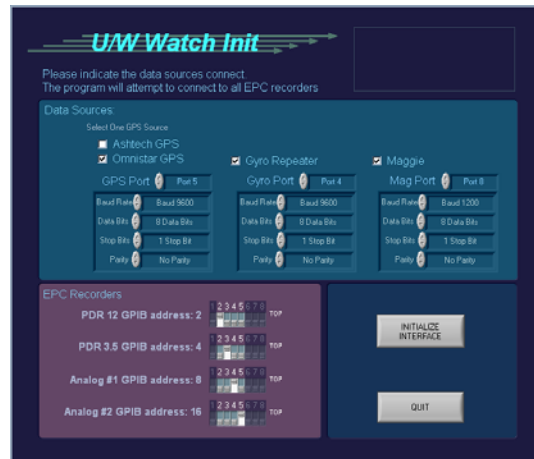

Back to a normal startup…

A dialog box will open where you can enter the current Leg and Line number. The controls will contain the last values used. When done click OK.
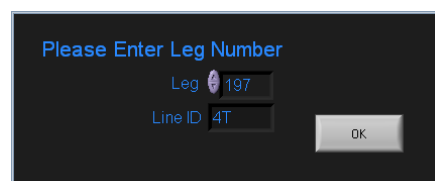
Note: The Leg and Line values are used to make the folders and file names for the magnetic data files.

Except for the Ashtech GPS receiver, the UW application does not control any of the data sources but instead monitors their data stream to WinFrog #1. So the first step in the initialization process is to look for the GPS data stream. The UW application expects the GPS receiver to broadcast the following message formats: GPZDA, GPVTG, and GPGGA. These are standard formats that both the Omnistar and Ashtech GPS receivers' support. If you are using the Ashtech receiver and the data stream is not seen nor correctly formatted, UW will send commands to the Ashtech receiver to begin transmitting the three messages. In the case of the Omnistar system you must use its initialization program to start sending the three messages.

GPS Initialization
Ashtech GPS On-Line
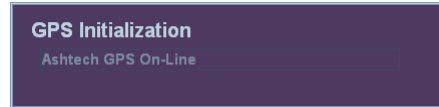
Next UW looks for the gyrocompass data stream. Upon power up the gyrocompass will begin to broadcast heading information. There are no initialization programs for this device.
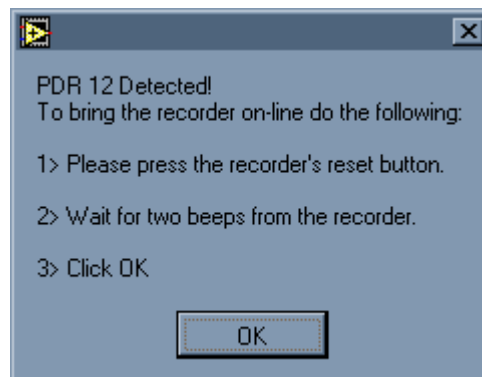
GYRO Initialization
GYRO On-Line
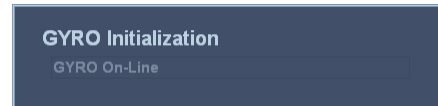
After the gyrocompass, UW will look for the Magnetometer data stream. Use the magnetometer's initialization application to setup communications if there is a problem.

Magnetometer Initialization
Checking For Data
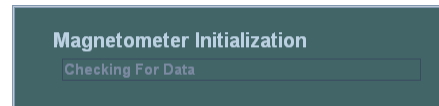
The final step in the initialization process is to find the EPC recorders that are on-line by searching for their GPIB addresses (2,4,8,16).

Note: it is best to have the EPC recorders already powered-up before starting the program but it's <u>not necessary</u>.

The EPC recorders can be turned on or off at anytime while the program is running. The UW constantly checks for any new EPC recorders on the GPIB. When UW sees that a recorder has powered up it will display a warning. **Make sure that you follow the instructions in the dialog box; otherwise, the GPIB interface on the recorder will locked up an you will get a lot of error messages anytime UW sends a command to the EPC recorder.**

PDR 12 Detected!
To bring the recorder on-line do the following:

1> Please press the recorder's reset button.

2> Wait for two beeps from the recorder.

3> Click OK

OK

If you continue to see error messages, then press the recorder's reset button (top left corner). This should clear up the problem. If you continue to have problems re-initialize the UW application (see below).

It is best not to power up a recorder near the time when the 5- or 30-minute mark is printed. While this dialog box is displayed, the UW application is locked and not updating.

Once this last step is completed the main window of the UW application will open.
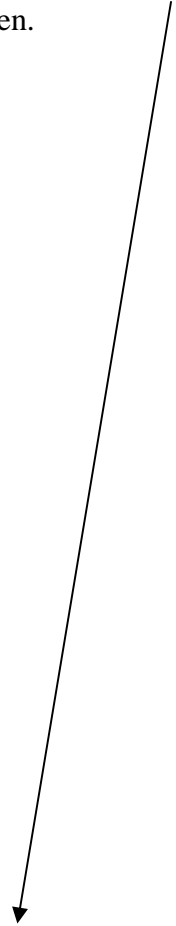
Initializing U/W Watch

As mentioned in the previous section the *U/W Watch Init* control panel will open if the setup file cannot be found during initialization. Also, this same control panel can be accessed from the menu bar once the program has open.
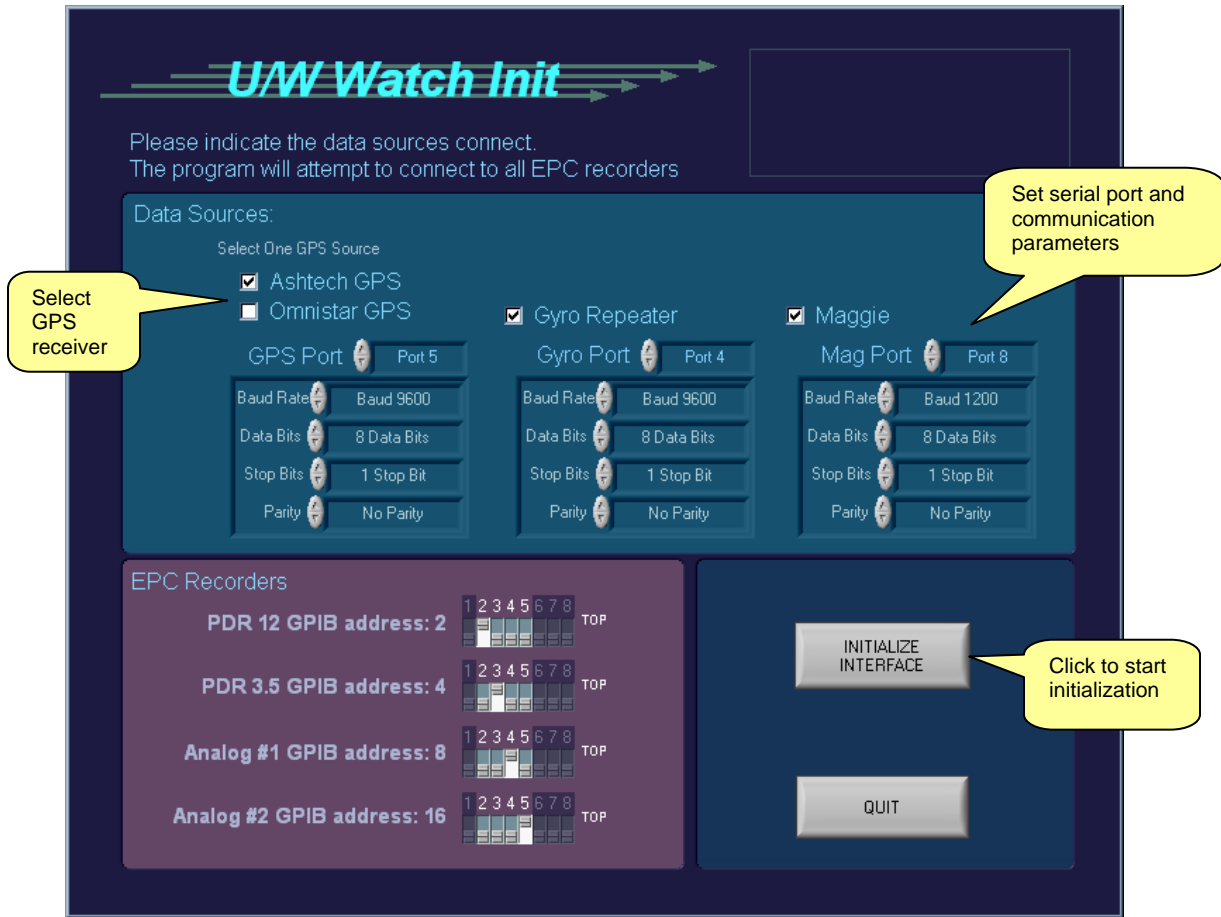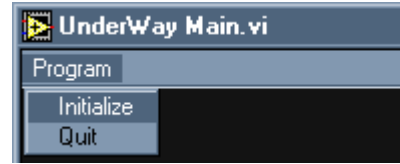

From this control panel you can select either the Ashtech or the Omnistar as the source for GPS data and set the serial port number and the serial communication parameters for the gyrocompass and magnetometer, as well. After setting the parameters click the INITIALIZE INTERFACE button. UW will perform the initialization process as described in the Setup section of this manual; except that once the GPIB bus is initialized it will show the on-line EPC recorders. You can confirm the connection to these recorders by commanding each, in turn, to start a test print by clicking CONFIRM EPC CONNECTION BY TEST PRINT button.
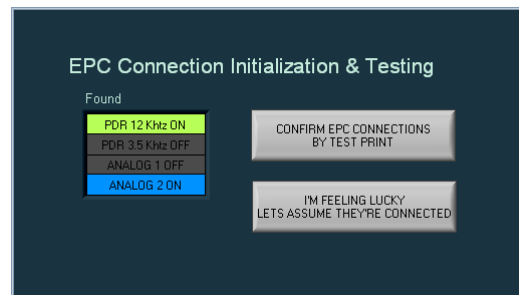
Using the U/W Watch application
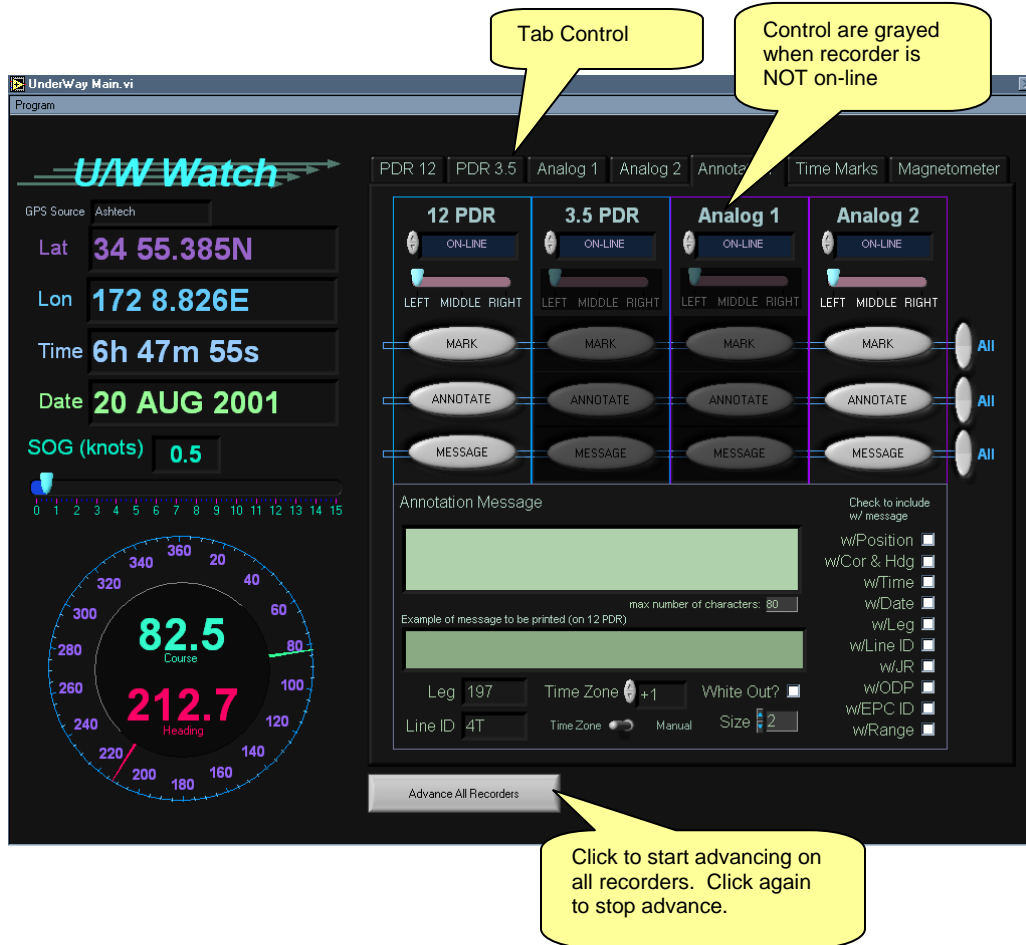
Data Display

On the left side of the window the values for the ship's position, speed over ground (SOG), heading, course, GMT time from the GPS receiver and gyrocompass are displayed. These values are updated every ½ second. When the window first opens it is common for these values to rapidly update as the contents of the serial buffer is read. Within 1 or 2 seconds the display will catch up with the data sent from the GPS receiver.

When using the UW application, **DO NOT** run any other applications other than the Excel for the depth table. UW is involved in real-time data acquisition, which uses most of the computer's resources. Running another applications at the same time can cause data to be missed or hang up the computer.

Please note that the position displayed is antenna position is not corrected to the moonpool.

All Recorder Rapid Advance
You can cause all on-line EPC recorders to rapid advance by clicking the Advance All
Recorders button at the bottom of the window. Click this button again to stop advance.
The button will blink yellow when advancing.

Tab Control
On the right side of the window is a tab control. Click on the tab to access the features of
that tab's page. The following will describe the features of each page:
PDR 12, PDR 3.5, Analog 1, and Analog 2 Tabs:
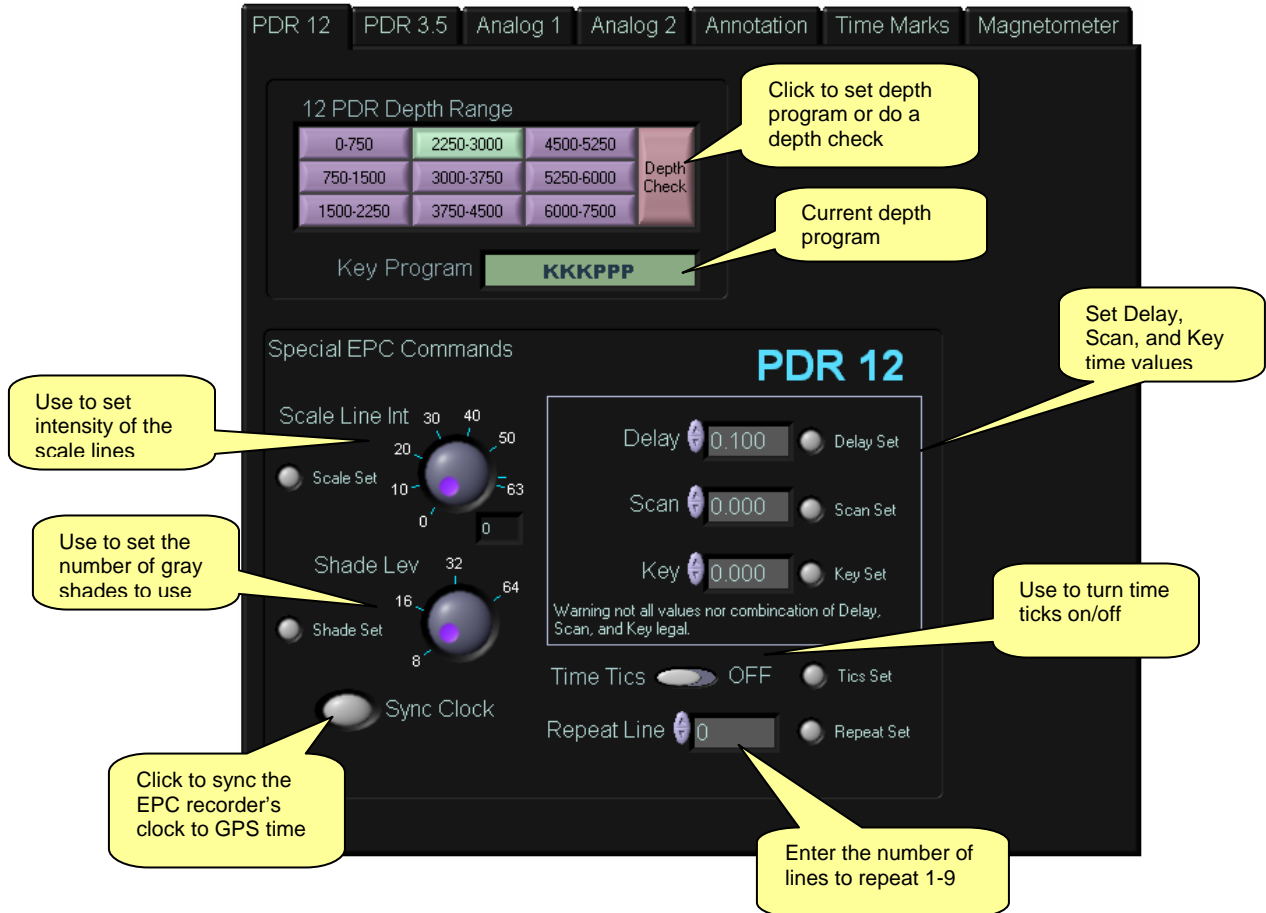
The tabs for PDR12, PDR 3.5, Analog 1 and Analog 2 are identical in function and
appearance with the exception that the Analog 1 and 2 tabs do not have the depth
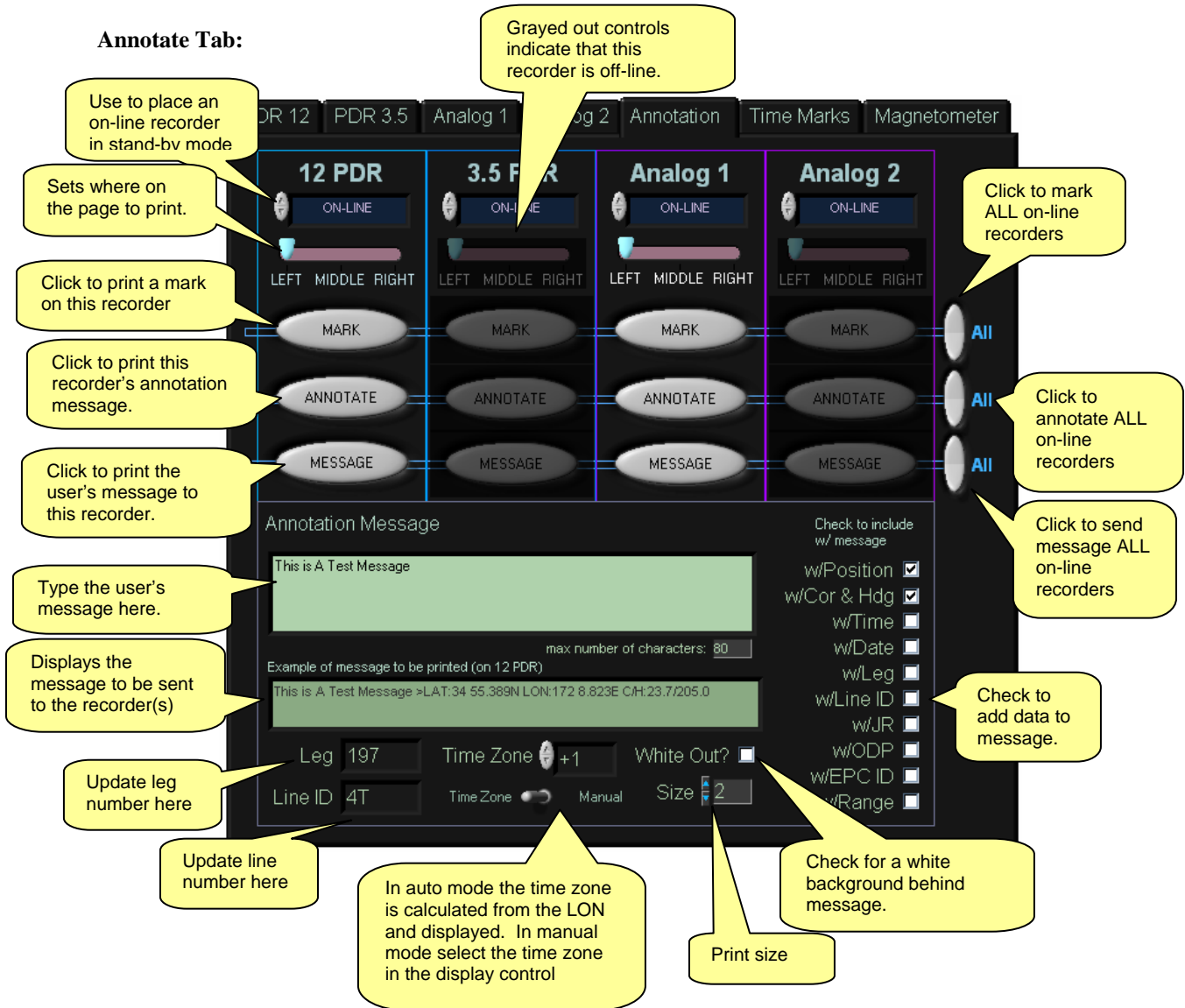program controls

Depth Controls: The depth program controls on the PDR 12 and 3.5 tabs are used to
send the depth program to the EPC recorder. The UW will take care of setting the correct
delay time (always 0.100), scan time, and key time when switching between a depth
check (8-sec) and depth range (1 sec). The current depth program's key, gate, and print
sequence is displayed below.

Special EPC Commands: This group of controls provide access to special EPC commands or settings that cannot be executed from the EPC recorder's control panel. Except for the Sync Clock button, you must set the value of the control and then click the Set button to send the command to the recorder.

- Scale Line Int: Sets the intensity that the scale lines are printed at.
- Shade Lev: Sets the number of shades-of-gray that are used to represent a voltage from –10 to + 10 (the intensity of the returned signal).
- Sync Clock: Sets the recorders internal clock (time, day month, and year) to the current GPS value.
- Delay, Scan, and Key: Sets the time for these parameters.
  Warning, the recorder will accept not all time values or combination of time values. I would refer you to the EPC manual but it is very vague on this subject! Only use these controls when the recorder's panel controls do not provide the time value you need. **IF YOU USE THES CONTROLS ALWAYS CONFIRM THAT THE COMMAND WAS ACCEPTED BY CLICKING THE RECORDER'S ANNOTATE BUTTON TO PRINT THE RECORDER'S CURRENT SETTING.**

- Time Tics: Turns on the recorders 1-minute time ticks.
  This is not the same as the 5-min, 30-min, and 4 hour time marks. If you use this feature, then make sure that you first set the recorder's clock to GPS time; otherwise, UW's time marks and the recorder's time tics will not agree!

- Repeat Lines: Sets the number of times that the same line of data is printed (1-9). It used to change vertical aspect of the print out. The feature is only used on the Analog 1 and 2 recorders.

Before leaving the subject of special commands, it is important for you, the watch stander, to understand that the values shown by the UW program or on the recorder's panel, **may not be** the values in use by the recorder. The last command sent by the program or the panel is the most current but there is no way to know who sent the last command! The EPC recorders do not provide functions to either lock out the panel controls or to query the panel controls for their current values. The only way to confirm what values are being used is to re-send the command from the UW program or the control panel, or to click the annotate button and print out the values.

Annotate Tab:

Grayed out controls indicate that this recorder is off-line.

Use to place an on-line recorder in stand-by mode

Sets where on the page to print.

Click to print a mark on this recorder

Click to print this recorder's annotation message.

Click to print the user's message to this recorder.

Type the user's message here.

Displays the message to be sent to the recorder(s)

Update leg number here

Update line number here

In auto mode the time zone is calculated from the LON and displayed. In manual mode select the time zone in the display control

Print size

Click to mark ALL on-line recorders

Click to annotate ALL on-line recorders

Click to send message ALL on-line recorders

Check to add data to message.

Check for a white background behind message.

Annotation Controls: On this page you will find controls for marking and printing. Under each recorder's name are four controls:

1. The justification control is used to set where time marks and user messages are printed (justified). Just set this control to the desired position and the next time a time mark or message is printed it will read this control's setting first.
2. Click the MARK button to print a line (mark) across the page.
3. Click the ANNOTATE button to print the recorder's annotation message (printer settings). Note, the EPC recorder and not the UW program, controls how the recorder's annotation message is printed. The UW justification control is ignored. Clicking the UW's ANNOTATE button and pressing the annotate switch on the recorder are one and the same.
4. Click the MESSAGE button to print the user's message.
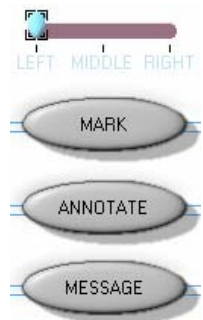
On the right side across from the buttons are three switches marked ALL. Clicking these switches will send the command to all on-line recorders.

User's Message: Below the Annotation controls is a text box where you can enter messages to send to the recorder. To the right of this text box are check boxes that you can check to add data to your message such as current position. Also, you can set the size of the print and to have a white background for your message. The length of you message is limited to 80 characters and shorter for the larger print size. The actual message that will print is shown below the text box.

Leg, Line, and Time Zone: When UW is first launched you will be prompted to enter the Leg and Line numbers. The value you enter there will be displayed in the Leg and Line number controls displayed on this page. You can change the values anytime by just typing into the controls. The time zone value can be set either by calculation from the current longitude (Auto mode) or selected by the user (Manual mode). A switch below the Time Zone control selects the mode. In Auto mode the time zone is calculated by dividing the longitude by 15 and rounding up and setting the value negative if it is east.

As already mentioned, the Leg and Line number values are used to create the folder (Leg number) and file name (Leg and Line numbers). When you change these values the old file is closed and a new file (with the new values) is created <u>without notifying</u> the user. Magnetic data is automatically logged to the new file. You may loose one data point if you make the change just as data is being written. You will not see any change in the magnetic data graph but the new file name will be shown in the Data Path indicator.
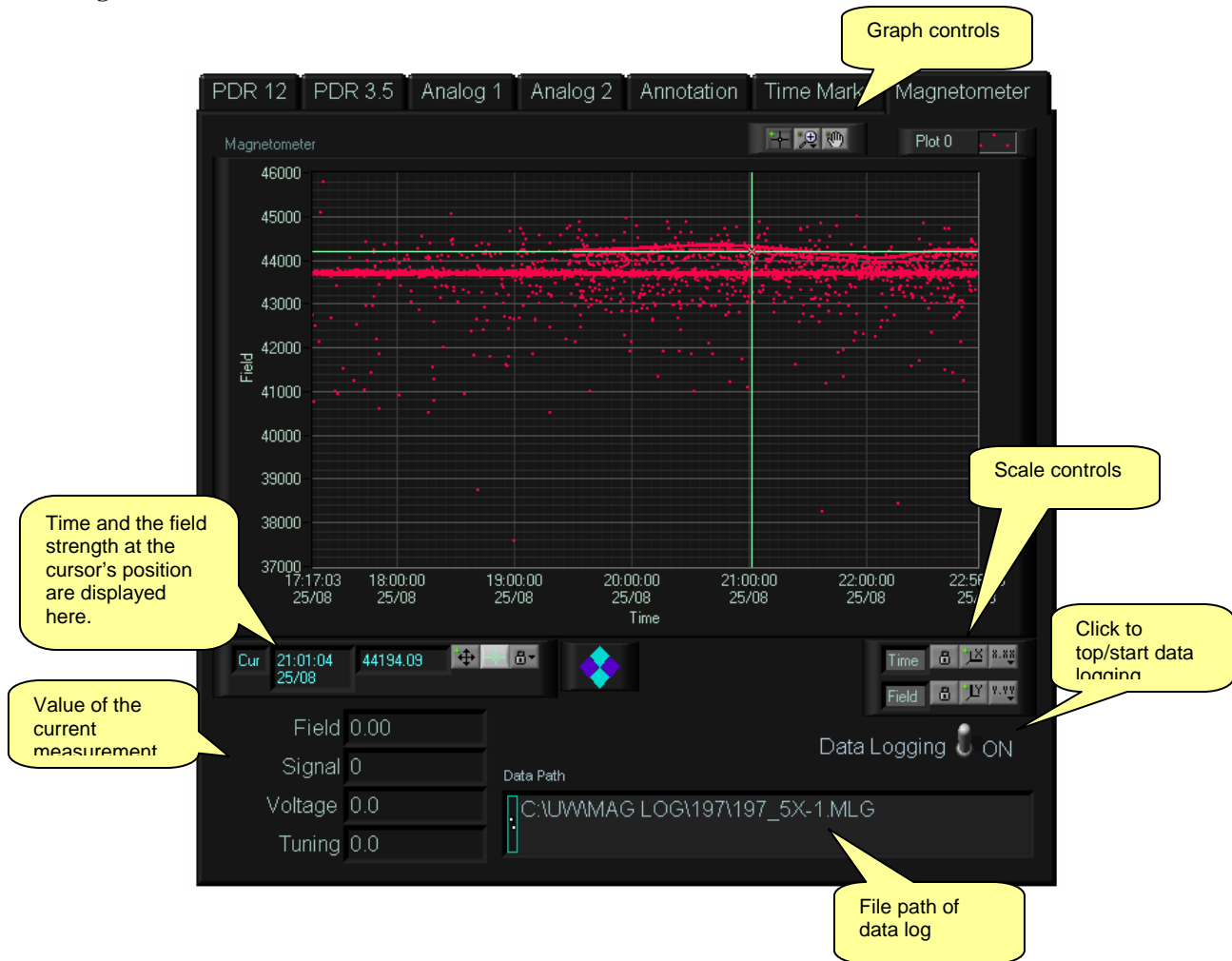
Time Mark Tab:
Use this page to turn the time marks on and off for each recorder. A time mark is on when the green indicator is lit.

| PDR 12 | PDR 3.5 | Analog 1 | Analog 2 | Annotation | Time Marks | Magnetometer |

Set the automatic Time Anotation for each recorder

12 PDR	3.5 PDR	Analog 1	Analog 2
5 min?	5 min?	5 min?	5 min?
30 min?	30 min?	30 min?	30 min?
4 hr?	4 hr?	4 hr?	4 hr?

Magnetometer Tab:

Graph controls

Scale controls

Click to top/start data logging

Time and the field strength at the cursor's position are displayed here.

Value of the current measurement

File path of data log

If UW is connected to the magnetometer and the magnetometer is on, its data will be displayed here. The graph will display the last 6 hours of data at a 3 second sampling rate. You must use either WinFrog or the Geometrics software to initialize and tune the magnetometer. Data logging is automatic; file names are created based on the Leg and Line number. You stop and start data logging by clicking on the Data Logging switch control. The MLG extension will be added to the name.

Each row in the data file has this format:
Mag_Field<tab>Minute<tab>Second<tab>Day<tab>Month<tab>Year<tab>Lat_Degree<tab>Lat_Minute<tab>N/S<tab>"LAT"
<tab>Lon_Degree<tab>Lon_Minute<tab>E/W<tab>"LON"<cr><lf>