



LYNX LG

Acquisition Software Manual



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Applicable Products
Scintrex :CG-6

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Table of Contents

Section	Page
1. Introduction	1-1
Overview	1-1
Minimum Tablet Hardware Specifications	1-1
Reference Documentation	1-1
Conventions	1-1
2. Software Installation And Bluetooth Setup	2-1
Lynx LG Software	2-1
Installation Procedure	2-1
License	2-2
Lynx LG Software Bluetooth Device Setup	2-2
Port Setup	2-3
Repair or Uninstall Lynx LG Software	2-5
3. Main Window Overview	3-1
General Information	3-1
Lynx LG Main Window	3-1
Main Window Parameters	3-3
Main Window Buttons	3-5
Main Window Menu Options	3-6
4. Main Window Buttons	4-1
Settings Button	4-1
Information Tab	4-1
Setup Tab	4-4
NMEA (National Marine Electronics Association)	4-7
Calibration Tab	4-9
Corrections Tab	4-12

Connect Button.....	4-14
Station Information Dialog	4-14
Details Dialog	4-15
Tablet Record Button.....	4-16
Recall Button.....	4-16
Reset Filter Button	4-17
Position Map Button.....	4-18
Buttons	4-18
Bouguer Map Button.....	4-21
Gravity Button	4-23
Filtered Gravity.....	4-24
Auxiliary	4-25
Difference	4-28
Trend	4-29
Calibrate.....	4-30
Tilt Calibration Test	4-30
Drift Calibration Test	4-32
Controlling Graphic Displays	4-32
5. Gravity Acquisition Setup	5-1
Create Station	5-1
To individually create a new station:	5-1
Add new station(s) using ACSII CSV file.....	5-1
Route Files	5-2
Create Route File	5-3
Order of Operation At New Station	5-6
Level Meter	5-6
Settings.....	5-6
Connect Button.....	5-7
Record	5-7
Stop Recording	5-7
Disconnect	5-7

6. Correction Theory.....	6-1
Gravity Corrections	6-1
Level Correction	6-1
Temperature Correction	6-2
Drift Correction	6-2
Tidal Correction	6-3
Berger	6-3
ETGTAB	6-6
7. License, Support And Maintenance	7-1
License.....	7-1
Support.....	7-1
Maintenance	7-1

Appendices

Appendix A Troubleshooting.....	A-1
--	------------

List of Figures

Figure 2-1 Lynx LG Main Window Displayed Tablet	2-3
Figure 2-2 Serial Port Dialog Example.....	2-4
Figure 2-3 Terminal Window Displaying Incoming Data	2-5
Figure 3-1 Lynx LG Main Window Displayed On Table	3-2
Figure 3-2 Lynx LG Main Window Menu.....	3-6
Figure 4-1 Settings: Information Tab Page	4-1
Figure 4-2 Setup Tab Page	4-4
Figure 4-3 Calibration Tab Page	4-10
Figure 4-4 Set/Get Factors Dialog	4-11
Figure 4-5 Settings: Corrections Tab Page.....	4-12

Figure 4-6 Station Information Dialog	4-14
Figure 4-7 Details Dialog	4-15
Figure 4-8 Data Lookup Dialog Showing Difference	4-16
Figure 4-9 Map Download Settings Dialog	4-19
Figure 4-10 Sample Aerial Map.....	4-20
Figure 4-11 Sample Road Map.....	4-21
Figure 4-12 Sample Bouguer Database Stations Map.	4-21
Figure 4-13 Sample Raw Gravity Plot	4-24
Figure 4-14 Gravity Axis Setup Dialog	4-24
Figure 4-15 Sample Filtered Gravity Plot.....	4-25
Figure 4-16 Filtered Gravity Axis Setup Dialog.....	4-25
Figure 4-17 Sample Auxiliary Channel Plots	4-26
Figure 4-18 Sample Auxiliary Corrections Plots.....	4-27
Figure 4-19 Auxiliary Axis Setup Dialog	4-27
Figure 4-20 Sample Difference Plot	4-28
Figure 4-21 Example Trend Histogram	4-29
Figure 4-22 Example Trend Times Series	4-29
Figure 4-23 Levels Calibration Setting Dialog	4-30
Figure 4-24 Drift Test Start Settings Dialog.....	4-32
Figure 4-25 Customization Dialog	4-33
Figure 4-26 Graphic Display Menu Options.....	4-33
Figure 5-1 Example CSV Index File	5-2
Figure 5-2 File Format Dialog	5-4
Figure 5-3 Sample File Column Selection Dialog	5-5
Figure 6-1 Setting: Correction Tab.....	6-1
Figure 6-3 Berger Setup Dialog	6-4
Figure 6-4 Berger Ocean Load Dialog	6-5
Figure 6-5 Load Terms Dialog	6-5
Figure 6-6 ETGTAB Setup	6-6
Figure 6-7 Example Delta Factor File Format.....	6-7
Figure 6-8 Ocean Load Dialog	6-9
Figure 6-9 Load Terms Dialog	6-10

Figure 6-10 Example Ocean Load file Form..... 6-11

List of Tables

Table 3-1 Main Window Parameter Description3-3
Table 3-2 Main Window Buttons Descriptions.....3-5
Table 3-3 Lynx LG Menu Options.....3-6
Table 4-1 Information Tab Page Parameters Description4-1
Table 4-2 Setup Tab Page Parameters Description.....4-4
Table 4-3 Calibration Tab Page Parameters Description..... 4-10
Table 4-4 Set/Get Factors Dialog Parameter Descriptions 4-12
Table 4-5 Corrections Tab Page Parameters Description 4-13



1. INTRODUCTION

Overview.....	1-1
Minimum Tablet Hardware Specifications.....	1-1
Reference Documentation	1-1
Conventions	1-1

Overview

The Lynx LG Land Gravity processing software support the new CG-6 Scintrex Autograv system for mineral, oil and gas exploration and microgravity applications. The Lynx LG software features a set of advanced tools for recording and presenting CG-6 data. This data can be represented graphically and numerically using many tools that the software has to offer. Some of the features include advanced corrections, graphical analysis, simple Bouguer mapping, positional information for enhanced speed in surveying, and station database structures for history comparison and repeatability.

Minimum Tablet Hardware Specifications

- Windows 7 Operating System
- Multi-processor Controlled
- 2 GB Internal RAM
- Wi-Fi
- Bluetooth
- GPS

Reference Documentation

- CG-6 Autograv™ Gravity Meter Operational Manual

Conventions

Dialog box menus, commands, dialog box titles, labels and options are bolded text in the user instructions. WARNING and IMPORTANT notes are highlighted in red.



2. SOFTWARE INSTALLATION AND BLUETOOTH SETUP

Lynx LG Software	2-1
Installation Procedure	2-1
License	2-2
Lynx LG Software Bluetooth Device Setup	2-2
Port Setup	2-3
Repair or Uninstall Lynx LG Software	2-5

Lynx LG Software

Licensed users of Lynx LG can download the latest Lynx LG software (LynxLGSetup.exe) from:

<http://www.microglacoste.com/Lynx LG/>

Installation Procedure

1. Run the LynxLGSetup.exe installer.
2. When prompted, enter the password provided with your license
3. The LynxLg setup, downloads and prepares the InstallShield Wizard which guides you through the installation.
4. The SD card formatter (SDF) is installed to optimize the CG-6 meter's SD card. An SD formatter icon is automatically created placed on the desktop.
5. MATLAB R2015a Runtime v85 (Install size 1292 MB) is also downloaded and installed.
 - Click **Next** when prompted.
 - Check **Yes** to accept the MATLAB Runtime License agreement. Then click **Next** to continue installation.
 - Choose the MATLAB Runtime installation location. It is recommend to accept the default location. Click **Next** then click **Yes** to create it if it does not exist.
 - Click **Install**.
 - When installation is complete, click **Finish**.
6. Microsoft Visual C++ 2013 Redistributable (x86) 12.0.21005 is installed and configured.
 - Accept the License Agreement if prompted.
 - Then click **Install**.
 - Then click **Close**. Do not reboot at this time.

NOTE

Your system may pop up a **Modify Setup** dialog for Microsoft Visual C++ 2013 redistributable (x86). Choose **Repair**. When complete, do NOT reboot at this time. Click **Close**. Complete the Lynx LG installation before rebooting.

7. Follow the InstallShield Wizard installation instructions to complete installing Lynx LG software on your system.

NOTE

No changes to the installation settings can be made. The installation destination folder is the required location.

8. Reboot the system.
9. Go to the [License](#) section for instructions on obtaining the Lynx LG software license password file.
10. Go to the [Lynx LG Software Bluetooth Device Setup](#) for instructions on setting up a Bluetooth device and configuring the port setup.

License



- Double click on the newly installed LynxLG program icon.
 - Select **Generate** when prompted. This creates a **Syschk.bin** file that is unique to this computer.
 - Note the location of this file on your local hard drive.
- Email the **SysChk.bin** file to info@microglacoste.com.
 - Wait to receive the **LynxLGPWInfo.bin** password file. This usually takes less than 24 hours during a normal business week.
 - This password file is good for future software upgrades and does not need to be recreated.

NOTE

The **Syschk.bin** files are unique for each computer, so please send one file at a time.

- Upon receipt of the LynxLGPWInfo.bin password file, manually copy it into the newly created **gInfo** directory (Usually c:\gInfo).
 - This is the default location for all Lynx LG license, setup and password files
- Double click on the LynxLG program icon.
 - A LynxLG loading dialog is displayed.
 - When loading is complete the main Lynx LG window is launched (Figure 2-1).

IMPORTANT

Due to details in the software protection of Lynx LG software, if at any time the user adds or removes hardware from the computer, it may be necessary to obtain a new password file by following the above steps.

Lynx LG Software Bluetooth Device Setup

Before configuring the Lynx LG software for field survey the tablet must be paired to a CG-6 as a bluetooth device.

- Make sure the host system is in discovery mode.

- Follow the instructions for bluetooth setup that came with your system.
- Make sure your bluetooth device is active on your system. Refer to instructions that came with your system.

Port Setup

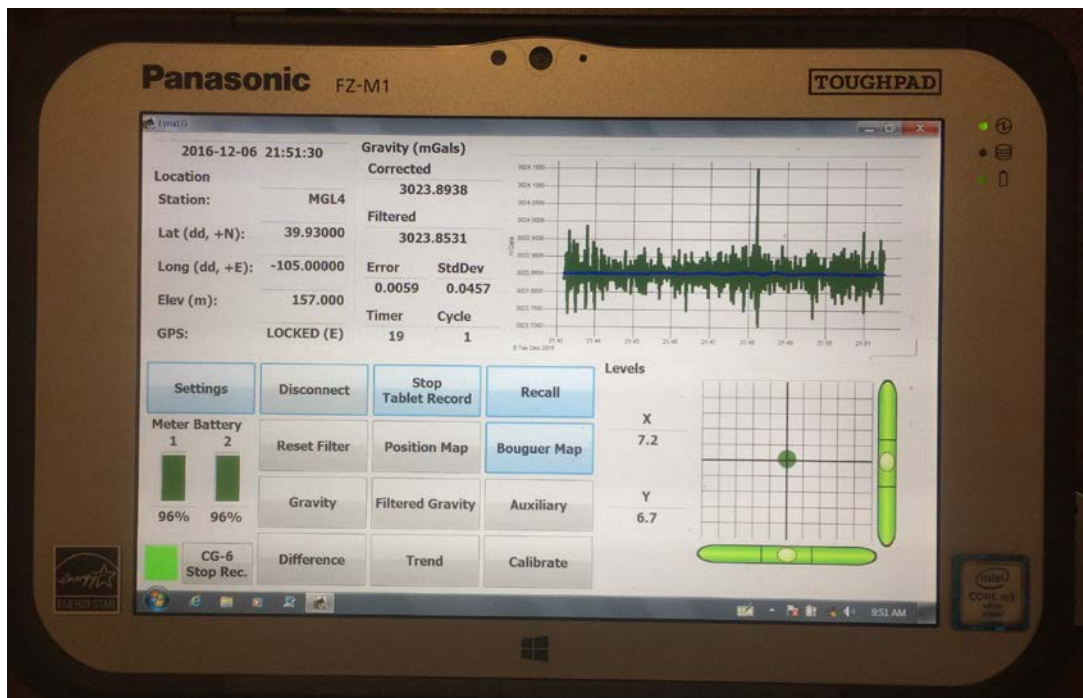


Figure 2-1 Lynx LG Main Window Displayed Tablet

- Start the Lynx LG software by double clicking on the LynxLG icon.
- In the Lynx LG main window (Figure 2-1), click **Settings**. Refer to [Section 03](#) and [04](#) for information on the Lynx LG main window options.
- Click **Setup** to access the **Setup** tab page.
- In the **Meter Communication** section, click **Port Setup**.
 - A list of the recognized serial ports is displayed. Click **OK**.
 - Click **OK** again when message "Currently selected meter serial port is not active or recognized. Please check serial port setup."
- In the **Serial Port** dialog (Figure 2-2) use the drop down list to select the active port and configure parameters for the bluetooth device.
 - Click **Check Ports** to see the list of recognized ports if needed.

- Suggested Bluetooth **Baud Rate**: 115200.
- Click **OK** when done.

NOTE

Two virtual serial ports are created. One port is actually connected to the meter data and receives data. The other does not receive any data. Select the port receiving data. Use the **Terminal** window to view the data.

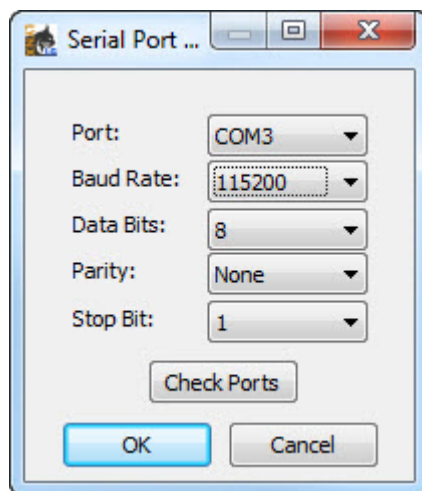


Figure 2-2 Serial Port Dialog Example

Terminal Window

- To access the **Terminal** window (Figure 2-3), click on the LynxLG icon in the upper left corner of the main Lynx LG window and select **Terminal Window** from the menu option list. Refer to [Section 03 Table3-3](#) for additional **Terminal** window information.
- Click **Connect** in the **Terminal** window.
 - If the correct virtual Bluetooth serial port was selected, clicking **Connect** starts displaying incoming data in the terminal window (Figure 2-3).
 - If no data is displayed, click **Disconnect** to disconnect from the serial port.
 - Return to **Port Setup** and select the other Bluetooth serial port.
- Click **Disconnect** to disconnect from the serial port. This does not close the **Terminal** window.
- Click **Exit** to disconnect from the serial port and to close the terminal window.

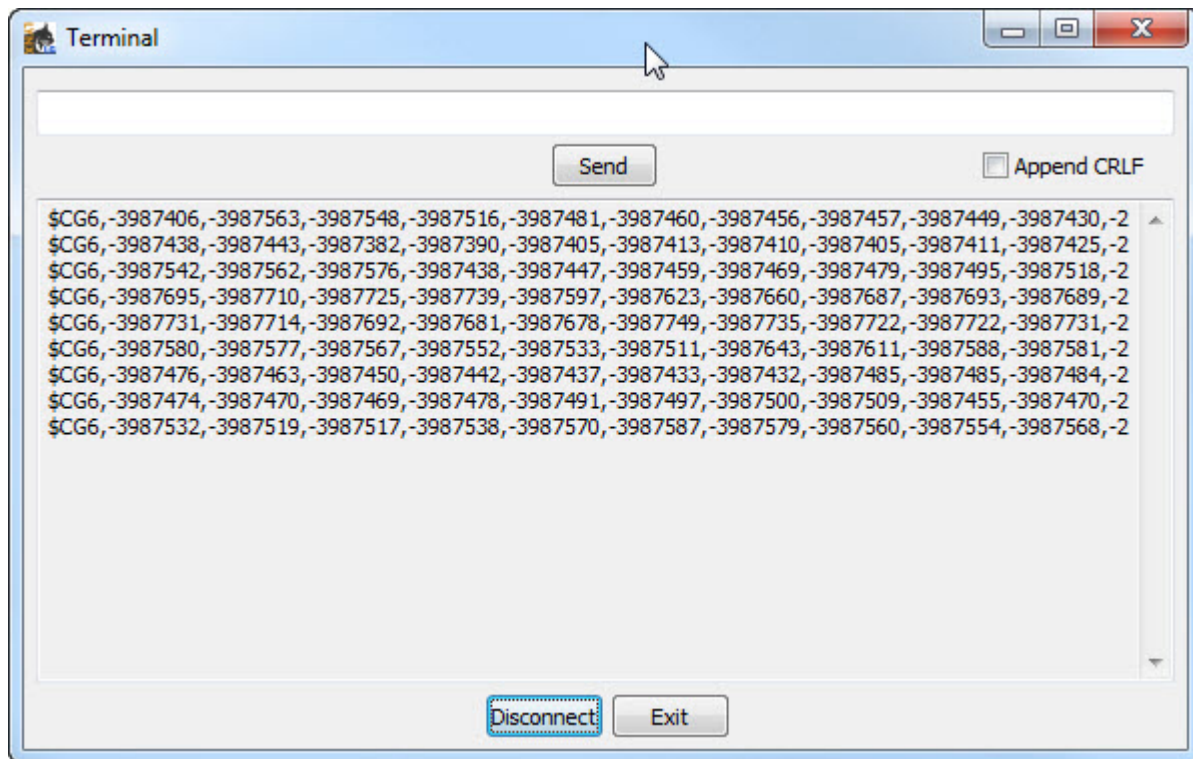


Figure 2-3 Terminal Window Displaying Incoming Data

Repair or Uninstall Lynx LG Software

New versions of Lynx LG may require you to uninstall Lynx LG before installing the new version. To uninstall Lynx LG software, run the LynxLGSetup.exe file, enter your provided password (if applicable) and then follow the InstallShield Wizard instructions to modify, repair or remove the Lynx LG software. You can also remove the Lynx LG software by using **Programs and Features** application in the operations system **Control Panel**.



3. MAIN WINDOW OVERVIEW

General Information	3-1
Lynx LG Main Window	3-1
Main Window Parameters	3-3
Main Window Buttons.....	3-5
Main Window Menu Options	3-6

General Information

The CG-6 Autograv™ Gravity Meter sends out:

- GPS string data at 1 Hz
- CG-6 streams meter data at 1 Hz
 - Has 10 gravity points
 - Gravity data comes in at 10Hz contained in 1 Hz packets

Lynx software stores information in three folders created at installation.

- C:\gData\LynxLG:
 - Stores the raw data, 1 Hz data and Filter data gravity files.
- C:\gData\LynxLG_Database
 - Stores survey database files
 - Lynx LG recreates these database files if anything is deleted.

IMPORTANT

Never edit any of these files. Editing of database files may cause unexpected results or behaviors.

- C:\gInfo\
 - Contains installation files. (license, setup and password files.)
 - Master LynxLG.ini file contains software and meter settings.

IMPORTANT

Do not edit this file unless directed by Scintrex.

- C:\OfflineMaps
 - Used for storing downloaded maps.

Lynx LG Main Window

The Lynx LG software main window (Figure 3-1) provides access to survey information and configuration settings. Refer to Figure 3-2 for example showing the menu options available from the main window.

Refer to Table 3-1 for an overview description of each of the Lynx LG main window parameters.

Refer to Table 3-2 for an overview description of each of the Lynx LG main window buttons.

Refer to [Section 05](#) for detailed gravity acquisition setup instructions.

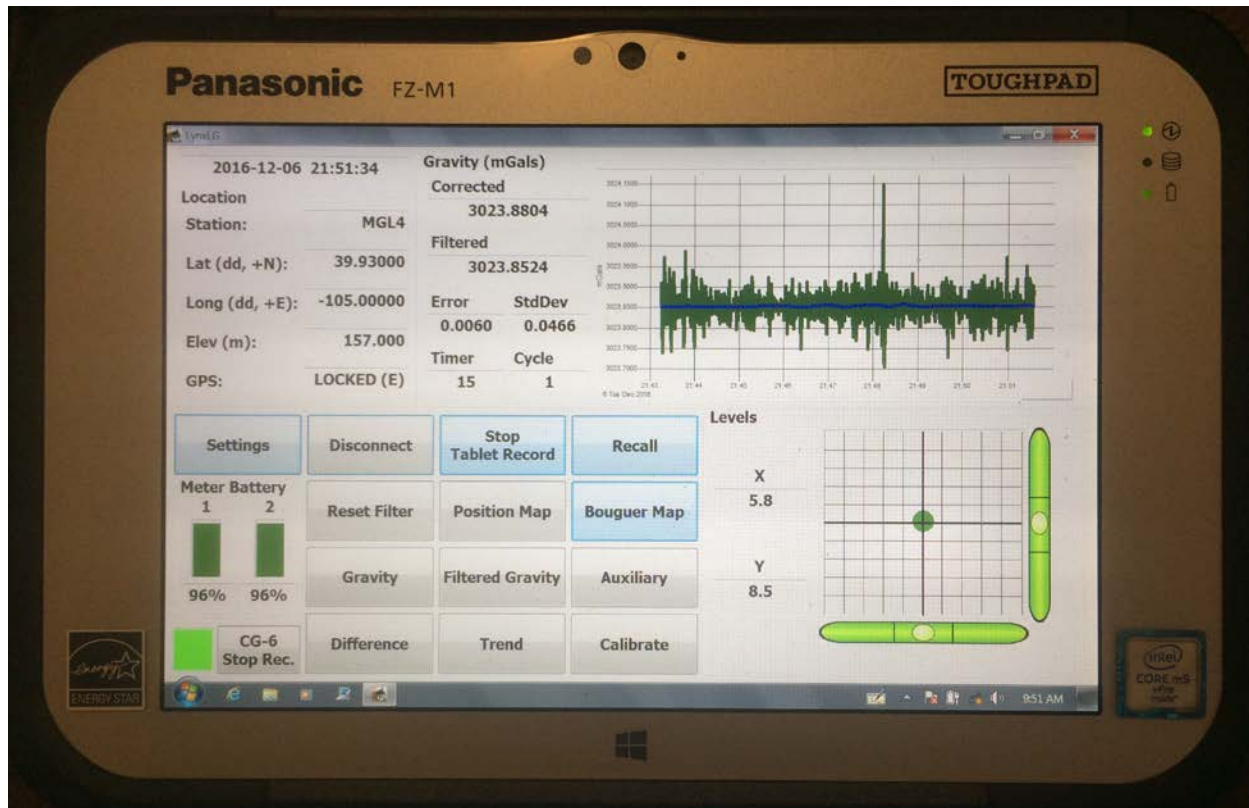


Figure 3-1 Lynx LG Main Window Displayed On Table

Main Window Parameters

Table 3-1 Main Window Parameter Description

Section	Parameter	Description
Location	Station:	User defined unique station name. Station name must not contain any spaces.
	Lat (dd, +N): Long (dd, +E): Elev (m):	Latitude and Longitude values in decimal format. Elevation values in meter. User can input latitude, longitude and elevation values when creating a new station name from the Settings, Information tab page. IMPORTANT: If there is existing data for the station, do not change this information. Create a new unique station name. NOTE: If data has been collected the information contained in the GPS, Latitude, Longitude and Elevation parameters may differed from the user input.
	GPS:	The tablet has built in GPS. Can also use a secondary serial port to acquire GPS. The CG-6 outputs GPS data at 1Hz. GPS status: LOCKED indicates system running locked to GPS. NO GPS indicates system running without GPS. Setup tab page has GPS communication set to Off or GPS is not valid.
Gravity (mGals)	Corrected	1Hz corrected gravity value
	Filtered	Filtered gravity based on the filtered measurement period in the Information tab page (accessed through Settings).
	Error	Standard error for the gravity data.
	StdDev	Standard deviation for the gravity data.
	Timer	Count down timer for the filtered gravity values. This number is based on the measurement period selected in the Setup tab page (accessed through Settings).

Section	Parameter	Description
	Cycle	<p>If Enable Cycles has been enabled (checked) on the Setup tab page (accessed through Settings), the Cycle indicates the number of gravity measurement cycles that have been configured.</p> <p>NOTE: Cycle =1 indicates it is running in continuous mode.</p>
Graph	Graphical display	<p>Graphical display of 1 Hz corrected gravity data and the running filtered gravity. The X-axis is always time. The Y-axis unit is in mGal. The range is set under on the Setup tab page(accessed through Settings) in the Gravity Graph Limits section.</p> <p>On tablet: A Clear Button is located in lower right corner of the graph. When clicked, it clears the graphic display screen. It does not clear information written to the database.</p>
Levels	X, Y	<p>Displays the long and cross bubble level values measured in arcseconds. Max/Min values for X/Y Level Graph Limits are set from the Setup tab page (accessed by clicking Settings).</p> <p>NOTE: Always make sure X Max/Min and Y Max/min are equivalent around zero.</p> <p>Example: X Max =200 then YMAX =200 X Min = -200 Y min =-200</p>
Meter Battery	1,2	<p>Displays the status of the two CG-6 batteries.</p> <p>NOTE: The tablet battery life span is dependent on the tablet and battery type. Refer to the tablet manufacturer specifications.</p>
CG-6 Stop Rec.	Color status box	<p>Allows operator to trigger record on the CG-6 Autograv™ Gravity Meter from the tablet.</p> <p>Red indicates CG-6 is not recording gravity data.</p> <p>Yellow indicates meter not communicating to the tablet.</p> <p>Green indicates CG-6 is recording gravity data.</p>

Main Window Buttons

Refer to [Section 04](#) for detailed usage information on the main window buttons.

Table 3-2 Main Window Buttons Descriptions

Button	Description
Settings	Provides access to the four tab pages: <ul style="list-style-type: none"> • Information (Station setup) • Setup (Communication setups) • Calibration (Meter calibrations) • Corrections (Select desired corrected gravity options)
Connect	Click to connect to the CG-6 Autograv™ Gravity Meter for real time acquisitions. Be sure Bluetooth is connected. Toggles between Connect/Disconnect.
Start Tablet Record	Click to Start/Stop (toggle) data recording.
Recall	Click to displays stations data results from the database.
Reset Filter	Click to reset the gravity filter.
Position Map	Click for access to geographical maps.
Bouguer Map	Click to display Simple Bouguer corrected map.
Gravity	Click to display both corrected and filter corrected gravity.
Filtered Gravity	Click to display filtered gravity.
Auxiliary	Click for graphical display of channels (X, Y Levels and Sensor Temperature) and Corrections (Level, Tide, Load, Temperature and Drift).
Difference	Click to displays the difference between any acquired data channels.
Trend	Click to displays station gravity histogram or time series for selected start and end dates.
Calibrate	Performs a tilt or drift calibration.

Main Window Menu Options

Access Lynx LG menu by clicking on the LynxLG icon in the upper left corner of the main window (Figure 3-2). Refer to Table 3-2 for description of each option.

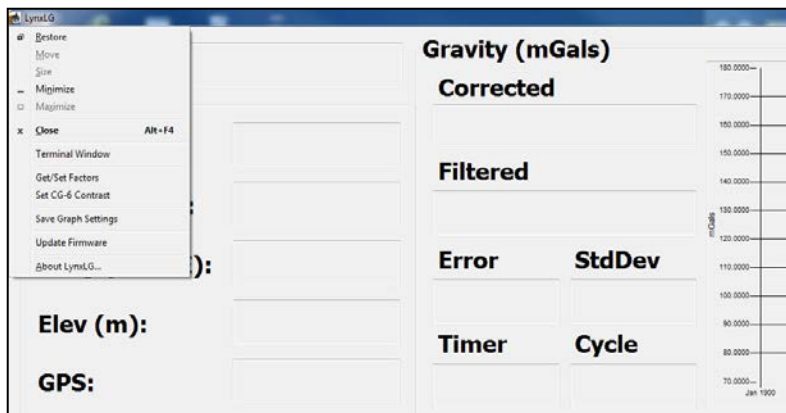


Figure 3-2 Lynx LG Main Window Menu

Table 3-3 Lynx LG Menu Options

Menu Option	Description
Restore, Move, Size, Minimize, Maximize, Close	Standard graphical file management utilities to restore, move, size, minimize, maximize or close the management window.
Terminal Window	<ul style="list-style-type: none"> • Meant for debugging the Bluetooth/COM port. • Clicking the Connect button establishes connection to serial port. • Data will be automatically loaded to the display when read on the Bluetooth COM port. • Type the commands to be sent to the meter in the text box, then click Send. • Use Append CRLF to add a CRLF (carriage return line feed) to the command. Then click Send. • The Disconnect button (displays when connection is established) disconnects communication to the serial port but does not close the Terminal Window. • Click Exit to both disconnect from the serial port and close the Terminal window.

Menu Option	Description
Set/Get Factors	Set/Get calibration settings for CG-6. Communicates with the CG-6 Autograv™ Gravity Meter.
Set CG-6 Contrast	Sets the contrast for the CG-6 display panel.
Save Graph Settings	If checked, saves the user selected options. If it is unchecked it goes back to the default settings.
Update Firmware	Used to flash the CG-6 firmware. WARNING Do not use unless recommended by Scintrex.
About LynxLG	Displays the current running version of the Lynx LG software.



4. MAIN WINDOW BUTTONS

Settings Button	4-1
Information Tab	4-1
Setup Tab.....	4-4
NMEA (National Marine Electronics Association)	4-7
Calibration Tab.....	4-9
Corrections Tab.....	4-12
Connect Button	4-14
Station Information Dialog.....	4-14
Details Dialog.....	4-15
Tablet Record Button	4-16
Recall Button	4-16
Reset Filter Button	4-17
Position Map Button.....	4-18
Buttons	4-18
Bouguer Map Button.....	4-21
Gravity Button	4-23
Filtered Gravity	4-24
Auxiliary	4-25
Difference	4-28
Trend.....	4-29
Calibrate	4-30
Tilt Calibration Test.....	4-30
Drift Calibration Test.....	4-32
Controlling Graphic Displays	4-32

Settings Button

Information Tab

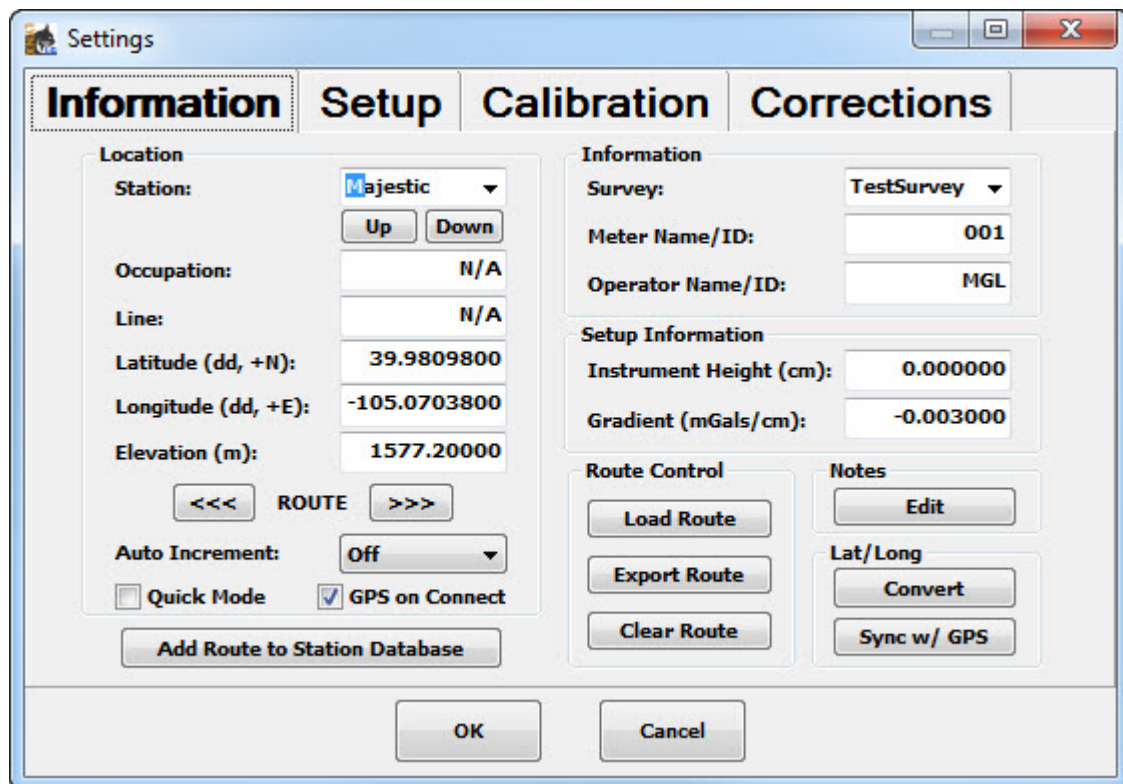



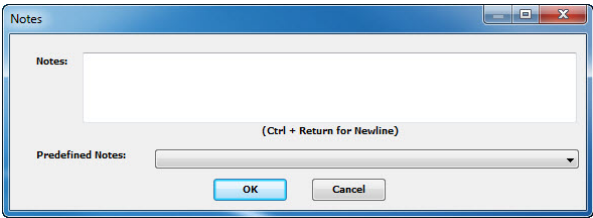


Figure 4-1 Settings: Information Tab Page

Table 4-1 Information Tab Page Parameters Description

Section	Parameter	Description
Location	Station	Select the station name from the drop down list or enter a unique station name. The station name should not contain any spaces. Use the Up or Down buttons   to navigate through the station list.
	Occupation	Enter alphanumeric indicator of current occupation.
	Line	Enter alphanumeric indicator of current line.
	Latitude (dd, +N)	Enter Latitude in decimal degree format.
	Longitude (dd, +E)	Enter Longitude in decimal degree format.

Section	Parameter	Description
	Elevation (m)	Enter elevation in meters
	ROUTE Buttons 	Scrolls forward or backward through the route list.
	Auto Increment Route	Use the drop down list to: <ul style="list-style-type: none"> • Off: Turns off auto incrementing • Station DB: Automatically increment to next station in the database. • Route: If route is loaded and cycles are enabled, the next station/location in the route is displayed when data collection completes.
	Quick Mode	Checking the Quick Mode box, turns off station and notes/file dialogs on connections. Use this feature with caution as it is for temporary quick field set up use only. A warning message popup appears reminding the operator that normal database station checks are disabled. WARNING This feature bypasses the normal behind the scenes database checks. It is important that the operator updates parameters such as Latitude, Longitude and Elevations as soon as possible for database integrity.
	GPS on Connect	<ul style="list-style-type: none"> • If checked the user receives warning if there is no valid GPS. • If unchecked no GPS is acquired.
	Add Route to Station Database	Add any unique stations from the loaded route file to the station database.
Information	Survey	Global survey name could contain a list of existing stations. Changing this will reload the existing stations if they exist in the database. Otherwise the survey database is created upon connection to the CG-6. User can also select existing surveys from the drop down list. The survey name should not contain any spaces.
	Meter Name/ID:	Enter CG-6 Autograv™ Gravity Meter name using alphanumeric characters.
	Operator Name/ID	Enter the operator's name using alphanumeric characters.

Section	Parameter	Description
Setup Information	Instrument Height (cm)	Enter the instrument height measured from the reference marker point to the top of the flat front of the meters. The Reference mark point = 0. User must determine best means to take this measurement
	Gradient (mGals/cm)	Enter the known vertical gravity gradient for the current station.
Route Control	Load Route	Load previously created route.
	Export Route	Export current route to CSV file which can be used as an index file. When used to create a route file to import must contain at minimum: Station name, LAT, LONG, Elevation..
	Clear Route	Clear route information
Notes	Edit	Provides quick alternate means to add station notes. 
Lat/Long	Convert	Converts degrees to decimal degree to UTM Northing/Easting. Put in one value and it will convert. Click OK to populate the field.
	Sync w/GPS	WARNING: Only use this with a new station to auto populate the latitude, longitude and elevations parameters. DO NOT USE WITH EXISTING STATION.

Setup Tab

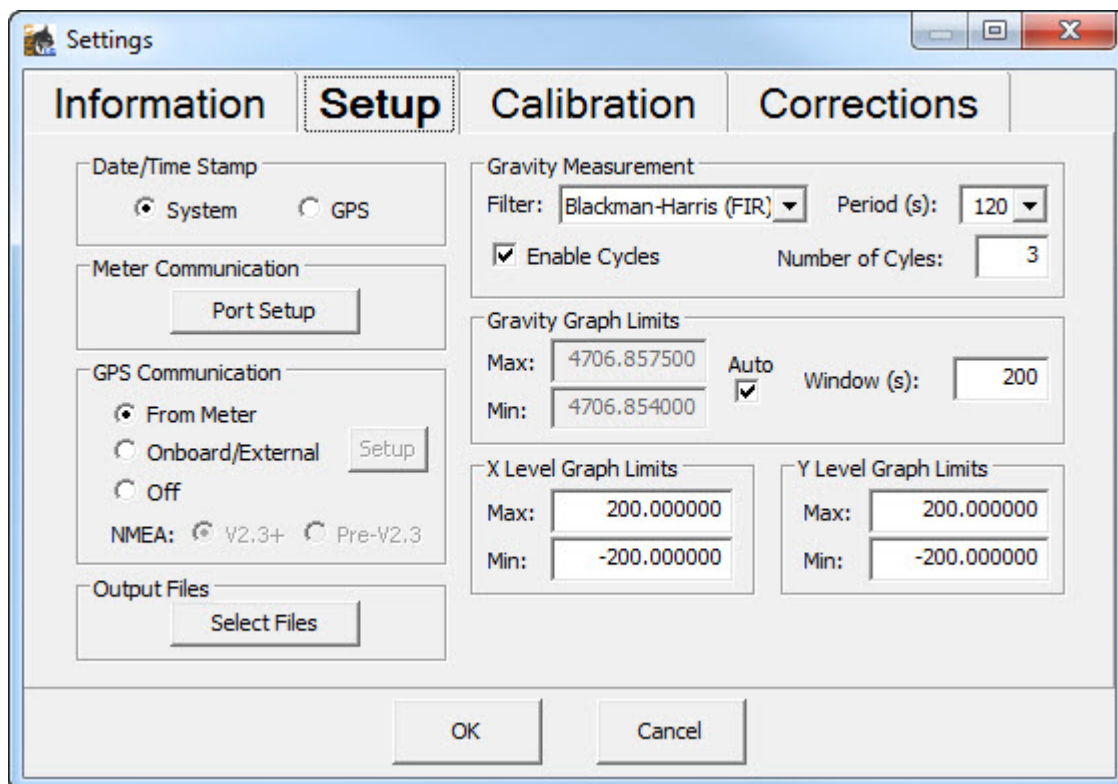
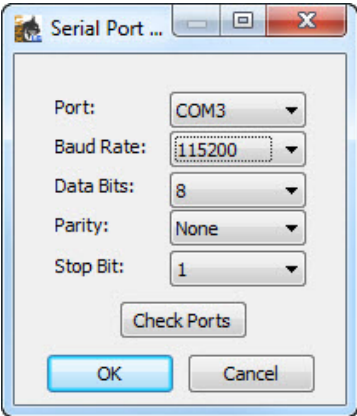
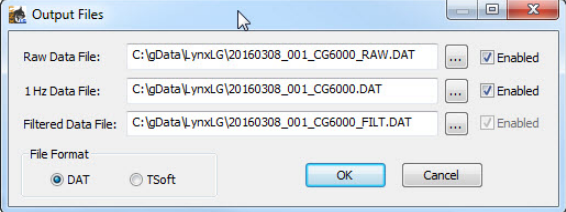


Figure 4-2 Setup Tab Page

Table 4-2 Setup Tab Page Parameters Description

Section	Parameter	Description
Date/Time Stamp	System	The date and time stamp for the data.
	GPS	If System is checked, the date/time is sent from the CG-6 Autograv™ Gravity Meter and that time is used as the data time stamp. If GPS is checked, GPS time is used to time stamp the data. NOTE: Be sure to set computer clock to UTC.

Section	Parameter	Description
Meter Communication	Port Setup	 <p>Click to setup the COM Port configuration settings for the CG-6. The defaults are:</p> <ul style="list-style-type: none"> • Baud rate: 115200 • Data Bits: 8 • Parity: None • Stop Bit: 1
GPS Communication	From Meter	Uses GPS information from the CG-6 Autograv™ Gravity Meter.
	Onboard/External	<p>Uses GPS information from selected COM port. This could be onboard tablet GPS or another GPS source through a COM port. Click Setup to configure the COM port.</p> <p>Tablets have built in GPS (NMEA RMC, GLL or GGA). External GPS must have standard NMEA RMS< GLL and/or GGA.</p>
	Off	If selected, no GPS communication.
	NMEA	Refer to your GPS device for the current version. Default is 2.3+. Refer to NMEA (Nation Marine Electronics Association) section below for additional information.

Section	Parameter	Description
Output Files	Select Files	 <ul style="list-style-type: none"> • Click Select Files access the Output Files dialog. • Check Enabled next to output data file type desired. Edit the filename and location for the output file if needed. • Select DAT or TSoft for the output format. Click OK. <p>NOTE The Filtered Data output file is always created and cannot be unchecked.</p>
Gravity Measurement	Filter	Select filter option. Choose either Blackman-Harris (FIR) or Moving Average from the drop down list.
	Period	If Blackman-Harris filter is selected set period 30, 60 or 120. The default is 120 If Moving Average filter is selected, enter any integer value.
	Enable Cycles	When Enable Cycles is checked the station records data for the set Number of Cycles and then automatically stops and a request pop-up dialog asks if you want to end this cycle. If route is loaded, it auto increments to the next station. If no route loaded, it stops and operator can repeat the same station. If Number of Cycles set to 1 and enable cycles is unchecked data is collected continuously until manually stopped.
	Number of Cycles	Input the number of cycles to run.
Gravity Graph Limits	Max/Min	The Max/Min are for the displayed graph Y axis values. The X axis is always date.
	Auto	If Auto is checked, the X and Y axis values are based on the incoming data.

Section	Parameter	Description
	Window (s)	Enter the number of seconds of incoming data that you want to view before the graph automatically scrolls.
X / Y Level Graph Limits	Max/Min	The X and Y values are the bubble level values measured in arcseconds.

NMEA (National Marine Electronics Association)

GPS Data

There are two ways to send GPS data to Lynx LG.

The first option is to use the CG-6 built in GPS. NMEA GPS serial strings are sent on the same serial line as the meter data. This data is parsed inside Lynx LG and GPS data is extracted. This data is also stored to the data file (DAT or TSoft) along with the meter data. Set this option by selecting **From Meter** in the **Setup** tab of **Settings** dialog.

The second options for acquiring GPS data is through another serial line that transmit continuous 1Hz serial NMEA GPS strings. This can be through Bluetooth, direct USB-to-serial connection or by using the tablets onboard GPS (virtual COM port). There is no direct handshaking on this GPS serial line, so the data must be continuously sent. The GPS data is parsed and GPS information is extracted. This data is also stored to the data file. Set this option by selecting **Onboard/External** in the **Setup** tab of **Settings** dialog. The settings for this serial port can be configured by clicking the **Setup** button located next to the **Onboard/External** option. The user can also select either **NMEA: V2.3+** or **Pre-V2.3**.

Currently there are three types of accepted NMEA GPS string formats: RMC, GLL, and GGA. GGA is the recommended string.

RMC

NMEA has its own version of essential GPS pvt (position, velocity, time) data. It is called RMC. The Recommended Minimum, which will look similar to:

```
$GPRMC,123519,A,4807.038,N,01131.000,E,022.4,084.4,23039
4,003.1,W*6A
```

Where	
RMC	Recommended Minimum sentence C
123519	Fix taken at 12:35:19 UTC
A	Status A=active or V=Void.
4807.038,N	Latitude 48 deg 07.038' N
01131.000,E	Longitude 11 deg 31.000' E
022.4	Speed over the ground in knots
084.4	Track angle in degrees True
230394	Date - 23rd of March 1994
003.1,W	Magnetic Variation
*6A	Checksum data

NOTE As of the 2.3 release of NMEA, there is a new field in the RMC sentence at the end just prior to the checksum.

GLL

Geographic Latitude and Longitude is a holdover from Loran data. The string should look similar to this:

\$GPGLL,4916.45,N,12311.12,W,225444,A,*1D

Where	
GLL	Geographic position, Latitude and Longitude
4916.46,N	Latitude 49 deg. 16.45 min. North
12311.12,W	Longitude 123 deg. 11.12 min. West
225444	Fix taken at 22:54:44 UTC
A	Data Active or V (void)
*iD	Checksum data

NOTE As of the 2.3 release of NMEA, there is a new field in the GLL sentence at the end just prior to the checksum.

GGA

Global Positioning System Fix Data. Time, position and fix related data for a GPS receiver. The string should look similar to this:

\$GPGGA,112202.00,3616.77852078,N,12947.17927965,E,2,13,0.9,35.101,M,28.768,M,9.0,1015*63

Where	
GGA	
112202.00	UTC of position
3616.77852078	Latitude of position
N	N or S
12947.17927965	Longitude of position
E	E or W
2	GPS Quality indicator (0=no fix, 1=GPS fix, 2=Dif. GPS fix)
13	Number of satellites in use
0.9	Horizontal dilution of precision
35.101	Antenna altitude above mean-sea-level
M	Units of antenna altitude, meters
28.768	Geoidal separation
M	Units of geoidal separation, meters
9.0	Age of Differential GPS data (seconds)
1015	Differential reference station ID
*63	Checksum data

NOTE In order to get the required data needed for Lynx LG, GGA is the recommended GGA string.

Calibration Tab

The Calibration tab page shows the parameter options for Gravity, Temperature and Levels. The **Calibration** tab page is used for converting raw values on the CG-6 serial string on the tablet. These values should match the values on the CG-6 to produce similar results.

NOTE These are all factory set and should not be changed unless directed by customer support.

Use the **Get/Set Factors** button to access the **Set/Get Factors dialog** (Figure 4-3). Refer to Table 4-3 for calibration parameter descriptions.

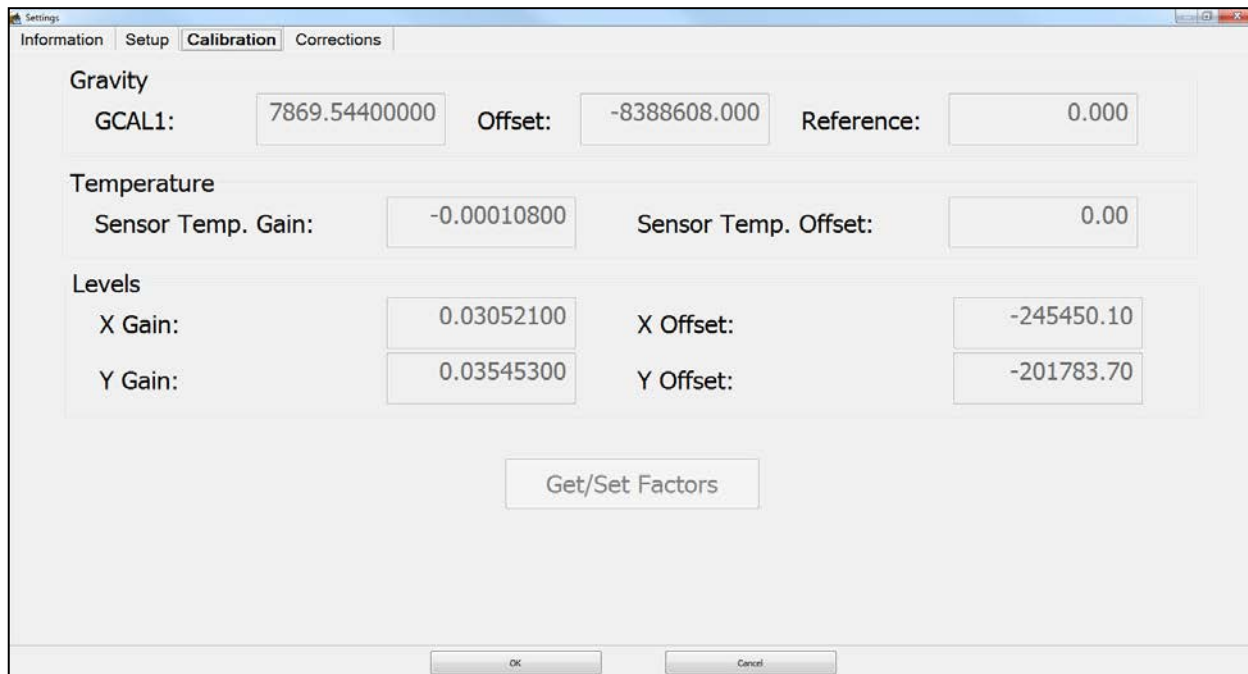


Figure 4-3 Calibration Tab Page

Table 4-3 Calibration Tab Page Parameters Description

Section	Parameter	Description
Gravity	GCAL1	Gravity = (Grav_sample – Offset) * (GCAL1/16777216) + Reference 16777216 is a full scale of the 24-bit A/D converter. IMPORTANT Do not change this parameter unless directed by Scintrex. This value is a factory setting.
	Offset	IMPORTANT Do not change this parameter unless directed by Scintrex. This value is a factory setting.
	Reference	The reference value is used to offset the relative gravity value into absolute terms.
Temperature	Sensor Temp. Gain	IMPORTANT Do not change this parameter unless directed by Scintrex. This value is a factory setting.
	Sensor Temp Offset	The Sensor Temp Offset is specific to each CG-6 unit. IMPORTANT Do not change this parameter unless directed by Scintrex. This value is a factory setting.

Section	Parameter	Description
Levels	X Gain /Y Gain	IMPORTANT Do not change this parameter unless directed by Scintrex or after running a tilt calibration. This value is a factory setting.
	X Offset /Y Offset	IMPORTANT Do not change this parameter unless directed by Scintrex or after running a tilt calibration. This value is a factory setting.
	Get/Set Factors	Refer to Get/Set Factors section below for addition information and instructions.

Get/Set Factors

The Get/Set factors values can be gotten from the CG-6 Autograv™ Gravity Meter or alternatively the values can be set on the meter by using the **Set/Get Factors** dialog (Figure 4-4). This is the only way to directly set or get values from the CG-6 when using the tablet. The **Calibration** tab page is just for converting values on the tablet. Values should be synced so the same results are on both the tablet and CG-6. Refer to Table 4-4 for Get/Set parameter descriptions.

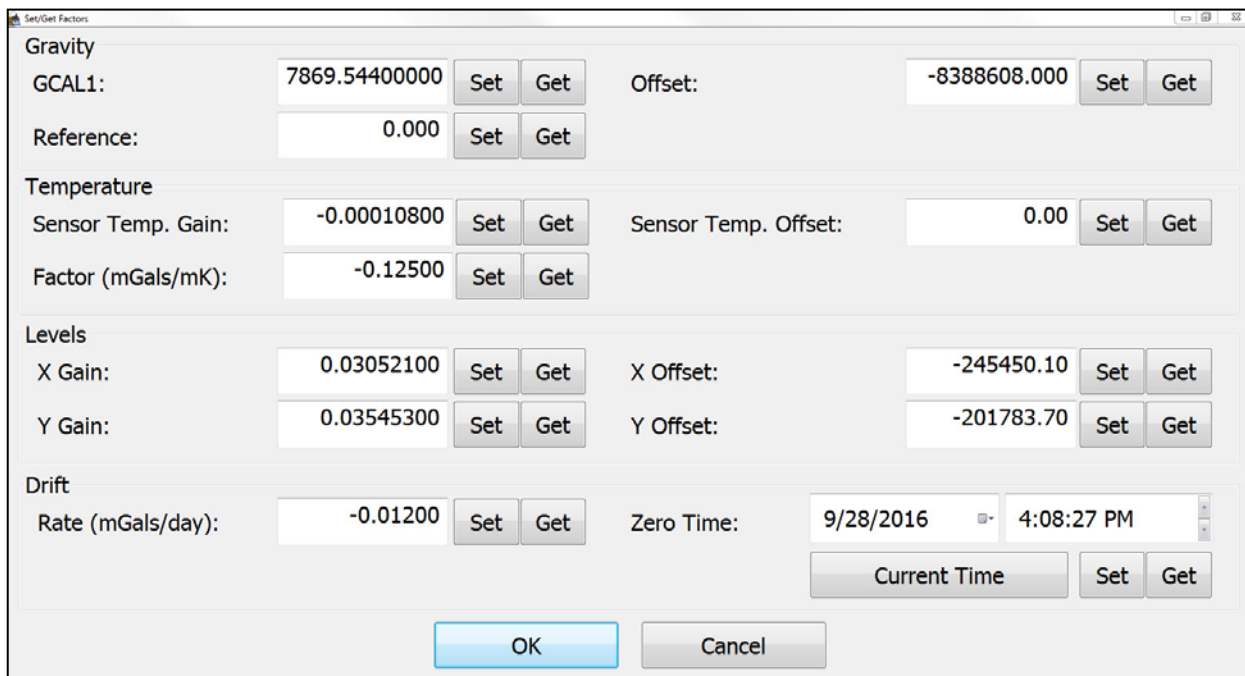


Figure 4-4 Set/Get Factors Dialog

Table 4-4 Set/Get Factors Dialog Parameter Descriptions

Section	Parameter	Description
Gravity	GCAL1	Refer to Table 4-3 for description.
	Offset	Refer to Table 4-3 for description.
	Reference	Refer to Table 4-3 for description.
Temperature	Sensor Temp. Gain	Refer to Table 4-3 for description.
	Sensor Temp Offset	Refer to Table 4-3 for description.
	Factor (mGals/mk)	Refer to Table 4-3 for description.
Levels	X Gain /Y Gain	Refer to Table 4-3 for description.
	X Offset /Y Offset	Refer to Table 4-3 for description.
Drift	Rate (mGals/day)	Refer to Table 4-5 for description.
	Zero Time	Refer to Table 4-5 for description.
	Current Time	Refer to Table 4-5 for description.

Corrections Tab

Refer to [Section 06](#) for additional correction information.

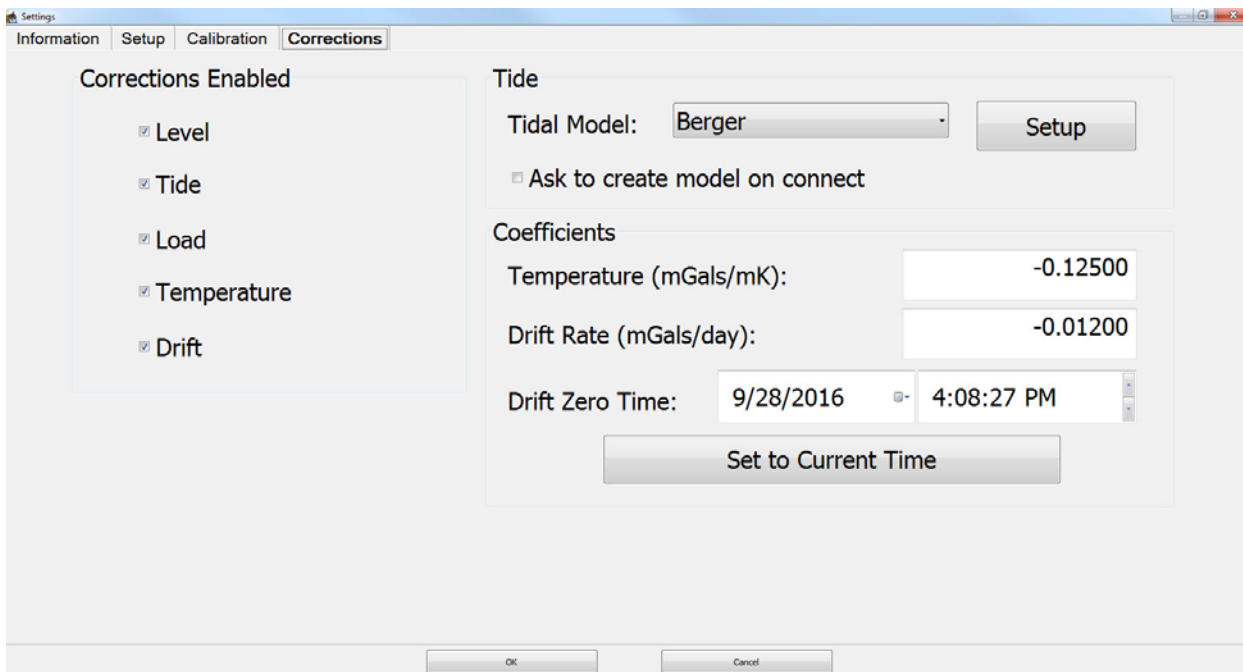


Figure 4-5 Settings: Corrections Tab Page

Table 4-5 Corrections Tab Page Parameters Description

Section	Parameter	Description
Corrections Enabled	Level Tide Load Temperature Drift	Check to enable correction. Corrections selected are added to the raw gravity value. Refer to Section 06 "Gravity Corrections" for further discussions.
Tide	Tidal Model	Click Setup to access Berger or ETGTAB setup dialogs. Refer to Section 06 "Tide Correction" for further instruction and discussion.
	Ask to create model on connect	Check to turn on request feature. If checked, oceanload and tide files can be automatically created when connecting to the meter
Coefficients	Temperature (mGals/mK)	The Temperature correction factor is based on the sensor temperature and compensates for the errors caused by meter temperature changes. Refer to Section 06 "Gravity Corrections" for further discussions.
	Drift Rate (mGals/day)	The Drift Rate correction compensates for long term meter drift rate. Refer to Section 06 "Gravity Corrections" for further discussions.
	Drift Zero Time	Drift Zero time is a reference point represented in seconds from January 1, 1904. Date and Time in UTC. Use arrow to select date from calendar. Use up/down arrows to change the time. Refer to Section 06 "Gravity Corrections" for further discussions.
	Set to Current Time	Clicking button sets the Drift Zero Time to the current computer time. Be sure the computer time is set to UTC time before clicking.

Connect Button

Use the Connect button to activate communication to tablet or CG-6 Autograv™ Gravity Meter. Setup the serial port before clicking on the Connect button. Refer to [Section 02](#) for port setup instructions. Be sure Bluetooth is active and the CG-6 Autograv™ Gravity Meter is paired to the tablet.

The following dialogs are displayed as a final check before connection is activated. When connection is established collected gravity data is displayed in the main window graphic but no data is recorded.

The graphic window begins displaying incoming data.

Station Information Dialog

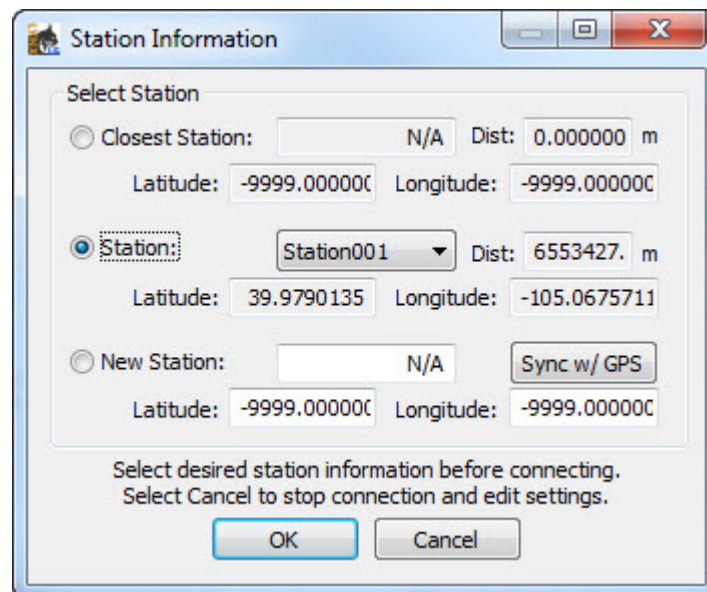


Figure 4-6 Station Information Dialog

Since all stations should be unique, the software will identify if you are close to an existing station or not before connection to the meter. So the user has a last option to change the station information before connection. There are three station selection options:

- Closest Station
 - If GPS is active and locked, GPS location is used to find the closest station to your current location.

- Station
 - Allows selection from the database list
- New Station (Unique station that does not yet exist in the database).
 - Allows creation of a new station
 - The **Sync w/GPS** automatically determines the current location Latitude and Longitude.

Details Dialog

The **Details** dialog (Figure 4-7) allows operator to do final select and/or check on the output data file(s) (Raw Data, 1Hz Data and Filtered Data) and to add any additional field notes to the output data file(s).

- The output files are typically located under the C:\gData\LynxLx folder.
- The default name format is yyyyymmdd_Station name_CG6000_DataType, but any unique filename is accepted.
- Check the enable box to enable file creation.
- Additional field notes are inserted into the files by:
 - Selecting from the drop down list in the **Predefined Notes** section.
 - Typing specific notes into the **Notes** text box.
- Select the output file format (DAT, Tsoft).

NOTE

The **Filtered Data File** output file is always created. The filename and location can be specified in the text box

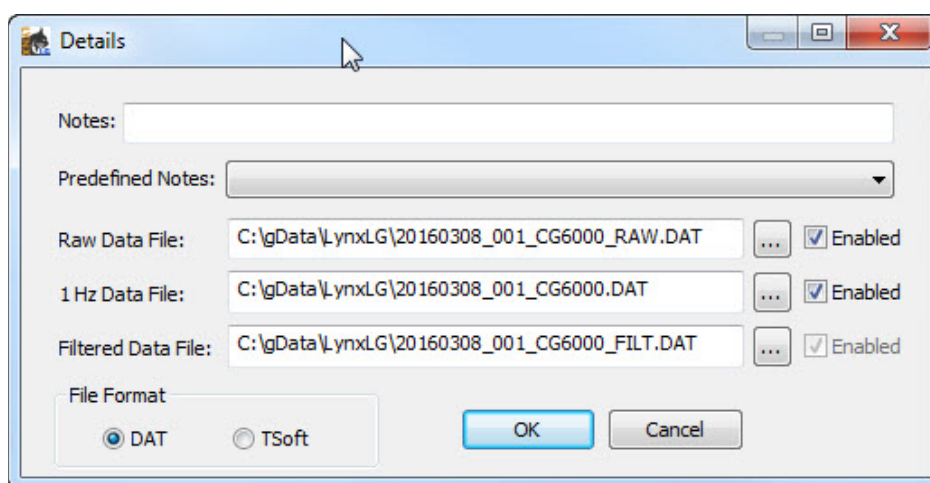


Figure 4-7 Details Dialog

NOTE

No data is being written to the file at this point even though the LynxLG main window is displaying the collected gravity data. A warning message that data is not being recorded is displayed. Click **Record** when configuration is complete.

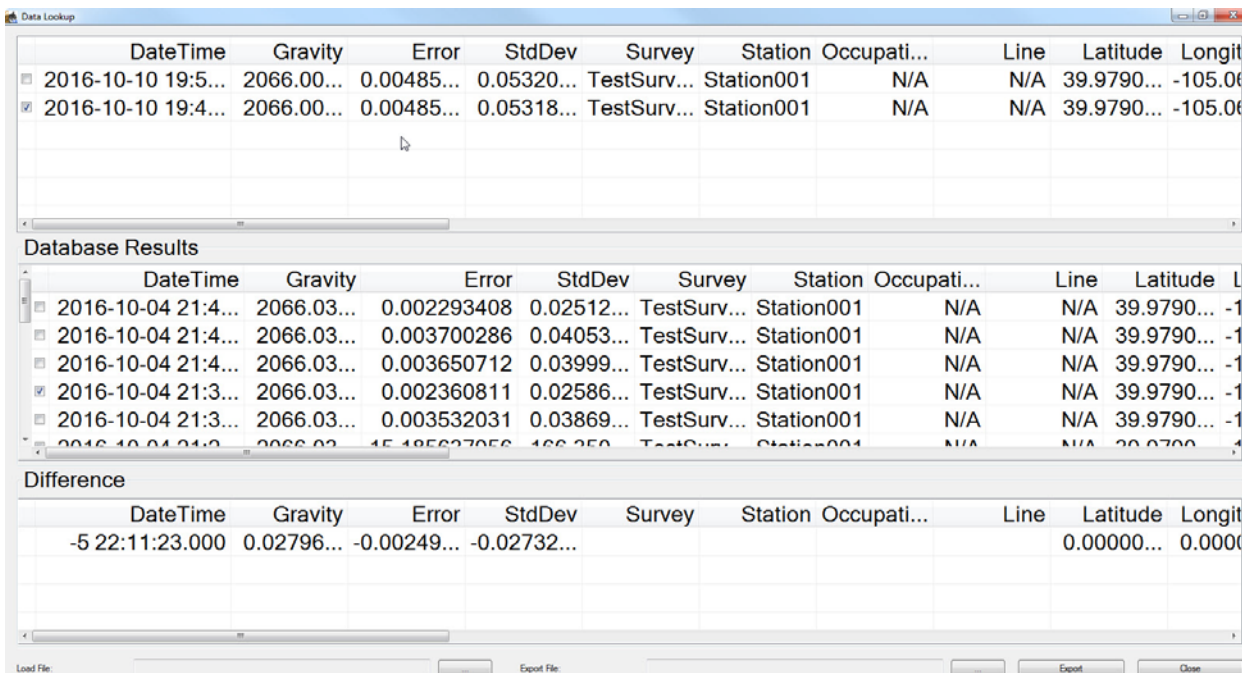
Tablet Record Button

The operator can monitor the incoming data on the main window graphic display. The **Tablet Record** option allows the operator to trigger recording from the tablet when extraneous noise and other data are eliminated.

Recording begins immediately and the timer countdown is reset. The gravity plot in the main window is cleared and reset to reflect the recording start time. Recording continues until the **StopTablet Record** is clicked or the cycle limit is reached.

Data is recorded to the output files as configured in the **Detail** dialog (Figure 4-7).

Recall Button



DateTime	Gravity	Error	StdDev	Survey	Station	Occupati...	Line	Latitude	Longit
2016-10-10 19:5...	2066.00...	0.00485...	0.05320...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06
2016-10-10 19:4...	2066.00...	0.00485...	0.05318...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06

Database Results									
DateTime	Gravity	Error	StdDev	Survey	Station	Occupati...	Line	Latitude	Longitude
2016-10-04 21:4...	2066.03...	0.002293408	0.02512...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06
2016-10-04 21:4...	2066.03...	0.003700286	0.04053...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06
2016-10-04 21:4...	2066.03...	0.003650712	0.03999...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06
2016-10-04 21:3...	2066.03...	0.002360811	0.02586...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06
2016-10-04 21:3...	2066.03...	0.003532031	0.03869...	TestSurv...	Station001	N/A	N/A	39.9790...	-105.06

Difference									
DateTime	Gravity	Error	StdDev	Survey	Station	Occupati...	Line	Latitude	Longitude
-5 22:11:23.000	0.02796...	-0.00249...	-0.02732...					0.00000...	0.00000...

Figure 4-8 Data Lookup Dialog Showing Difference

The **Recall** button launches the **Data Lookup** dialog (Figure 4-8) which displays three sections of data row lists.

The top section lists the latest currently acquiring data points for the selected station. A new data row is populated when a new filtered data point is calculated for all data. The most recent data row is always at the top.

The **Database Results** section lists the latest data from the database for selected station. The most current data is listed in the first row.

The **Difference** section shows the column differences between the two selected rows. Selecting two dataset rows will produce a new difference dataset.

Multiple differences can be loaded with the current difference dataset at the top.

Additionally an older gravity dataset file can be loaded by using the **Load file** option at the bottom of the window. Loaded file will display in the **Database Results** section. The file must be in the same column and format as the LynxLG file format.

NOTE Repeat data sets times are not loaded.

Use the **Export** button to export selected rows to a different *.dat file. First specify the **Export File** name then select the rows to export by clicking the checkbox next to the rows you want exported..

Click **Close** to close the **Data Lookup** window.-

Reset Filter Button

The **Reset Filter** button resets the filter applied to the gravity data shown in the main window graphic display. It does not reset data already written to the file. When clicked the displayed filtered data is reset and the filtering begins with the next data point. This allows the operator to reset the filter to eliminate any noise or other undesirable results when measuring gravity.

Position Map Button

There are two types of position maps: lat/long graph and geographical tile maps. If you choose geographical map, this option provides access to geographical maps via Wi-Fi. If survey location does not have access to Wi-Fi, it is recommended to preload survey maps. Downloaded maps are stored in c:\OfflineMaps. Click on the ? to display reference information about the map used.

NOTE

Do not modify files in the **OfflineMaps** folder. These files are downloaded and organized automatically.

If the user selects **NO** for geographical maps because no Wi-Fi is available and no maps were downloaded, a static display from is plotted on an X/Y graph where X is Longitude and Y is Latitude.

Both types of maps plot the current database or route station information as well as your current location. If GPS is not enabled or locked, the current location will be set to your current location configured in the Information tab of Settings.



Bulls eye icon shows station location. For the X/Y graph stations show up as black circles.



Tear drop icon shows your current location. For the X/Y graph your currently location shows up as a red diamond.

If GPS is active the icon showing your location moves as you move. If your position is close to a location a pop-up dialog displays location information. If click **Yes**, it will update your current station/location information with the database station information..

Buttons

Map Section

Under the Map section, use the drop down list to select display map types (Aerial, Road, Hybrid, Terrain, Offline). Figure 4-10 and Figure 4-11 show sample maps. Use other **Zoom In**, **Zoom Out** for zooming In/Out. The geographical maps are user interaction enabled. By using a finger or touch pen, the user can move maps and location around and also zoom in and out.

Down Load Map

Down load station maps if survey is conducted in an area without continuous internet access. Click on the **DL** button to access the **Map Download Settings** dialog (Figure 4-9).

Set the map points (min/max latitude and longitude) and then set the zoom level and map type. Click **OK** to download maps.

NOTE

The higher the zoom level, the higher the magnification and the larger the number of files downloaded. Depending on internet connection speeds, this can take hours to download, so make sure you have enough time to download all maps.

Do not manually edit these files.

A confirmation dialog displays the number of map tiles to be downloaded and the approximate space needed. Click **Yes** to continue the download or click **No** to cancel the download. Maps are stored at C:\OfflineMaps.

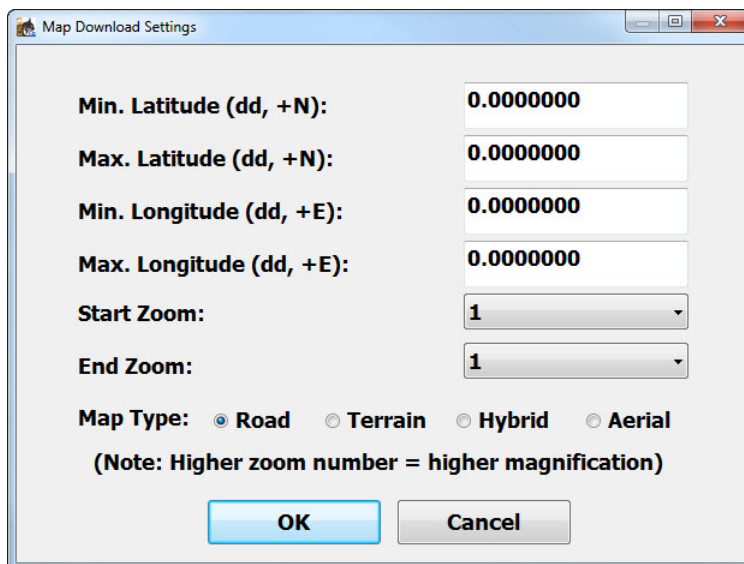


Figure 4-9 Map Download Settings Dialog

Right Click Section

- Check the **Info** button then right click to display Latitude/Longitude information.
- Check the **Dist** button then right click point on the map or next station.

- Line is drawn from the current location to the selected location.
- Right click to display the distance.
- Right click on the station to show station information.

Stations Section

Check **Database** to load station stored in the database. Check **Route** to load stations in the route list.

Other Buttons

- Me: Makes you the center point of the currently loaded graph.
- GoTo: Map redraws to center the selected station or the Latitude and Longitude position entered.
- Clear: Clears currently loaded data
- DelLn: Removes the distance line indicator.
- Load: Loads the selected station information (Database or Route).
- Close: closes the Position Map window.

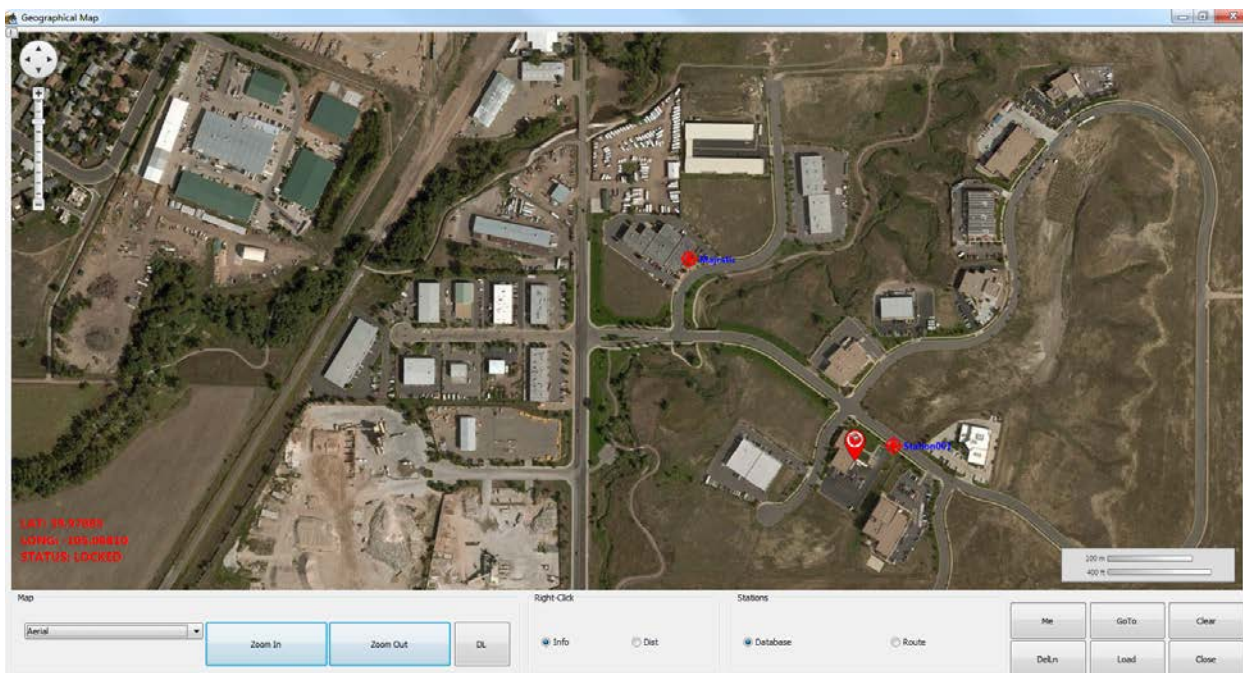


Figure 4-10 Sample Aerial Map

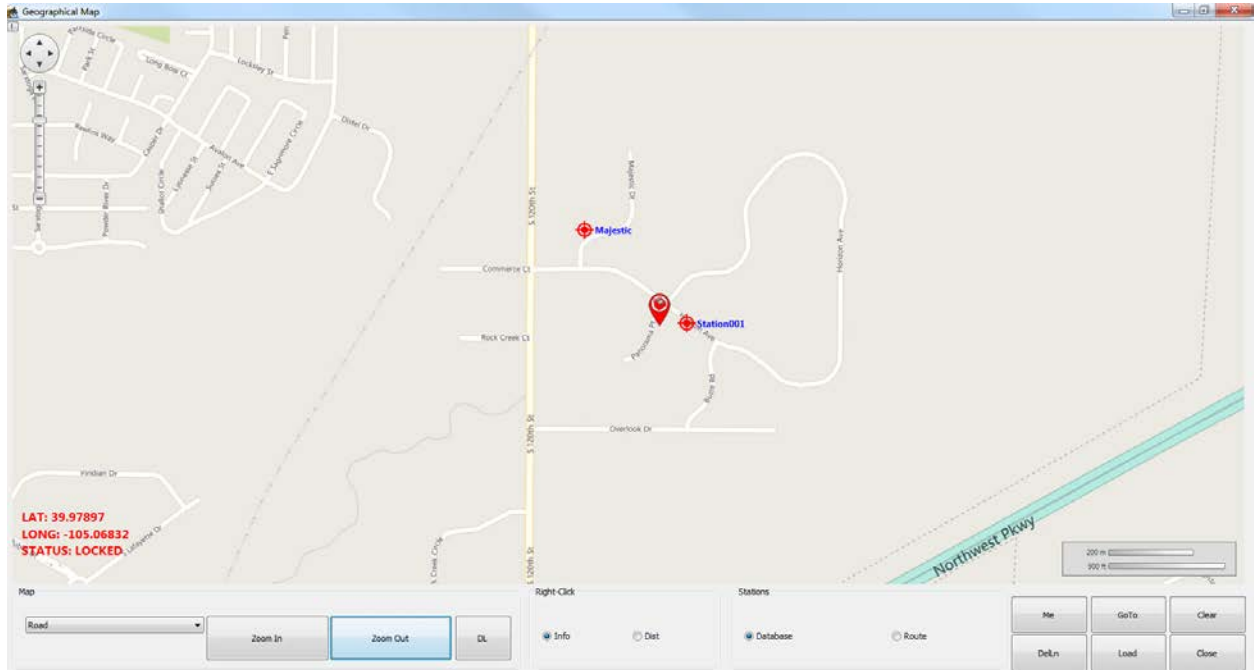


Figure 4-11 Sample Road Map

Bouguer Map Button

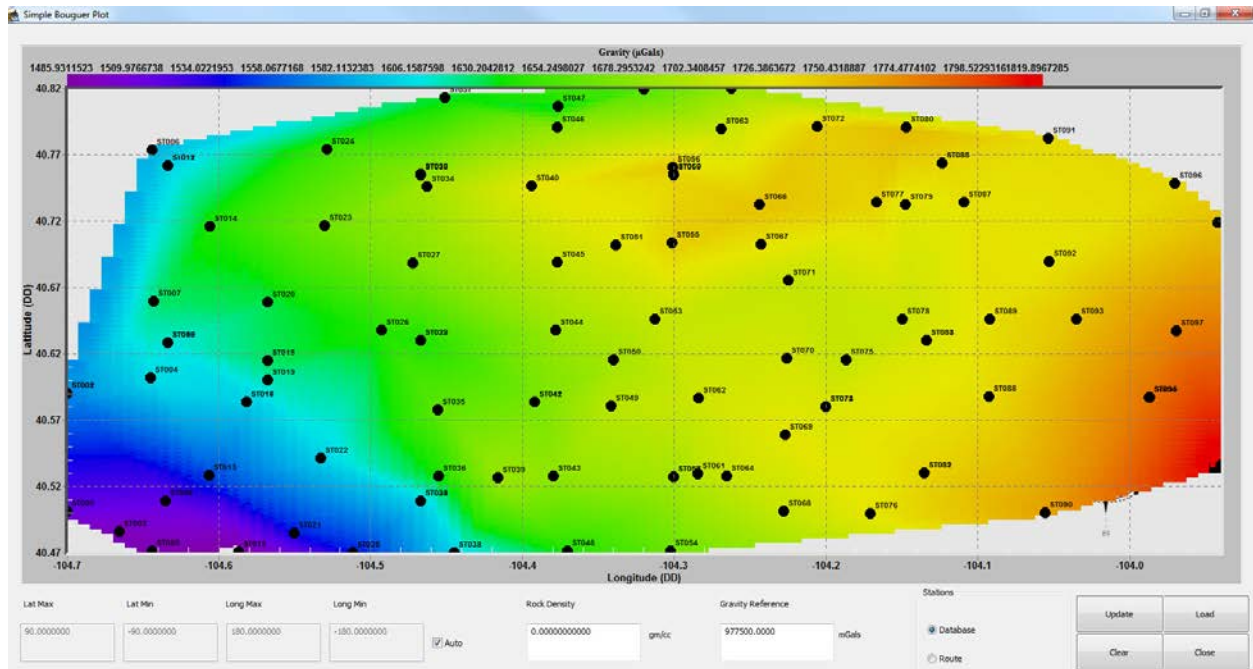


Figure 4-12 Sample Bouguer Database Stations Map.

Simple Bouguer Map (Figure 4-12) plots the current survey in the database

The simple Bouguer anomaly is the free-air anomaly corrected down to some pre-selected datum level (usually mean sea level). This is only a simple Bouguer map because it does not include terrain corrections. The gravity is corrected for Latitude Correction, Free-Air Correction, Bouguer Slab Correction and plotted on a Latitude/Longitude grid.

Bouguer gravity

$$g_{obs} + g_{Ref} + g_l + g_{fa} + g_b$$

where

g_{obs}	Observed Gravity in mGals
g_{Ref}	Gravity Reference (mGals)
g_l	Latitude Correction
g_{fa}	Free Air Corrected Gravity
g_b	Bouguer Slab Corrected Gravity

Latitude Correction Formulas

gl is the gravity formula value in milliGals

ϕ is the latitude

IGF30:

$$gl = 978049(1 + 0.0052884\sin^2\phi - 0.0000059\sin^2 2\phi)$$

IGF67:

$$gl = 978031.846(1 + 0.0053024\sin^2\phi - 0.0000058\sin^2 2\phi)$$

GRS80:

$$gl = 978032.67715 \frac{1 + 0.001931851353\sin^2\phi}{\sqrt{1 - 0.00669438002290\sin^2\phi}}$$

WGS84:

$$gl = 978032.53359 \frac{1 + 0.00193185265241 \sin^2 \phi}{\sqrt{1 - 0.00669437999014 \sin^2 \phi}}$$

Free-air Correction

gfa is the free-air correction value in milliGals

h is the orthometric height in meters

$$gfa = -\left(0.3087691 + 0.0004398 \sin^2 \phi\right)h + 7.2125 \times 10^{-8} h^2$$

Bouguer Slab Correction

gb is the free-air correction value in milliGals

$\bar{\rho}$ is the average density of underlying rock in gm/cc

h is the orthometric height in meters

$$gb = -0.04193 \times \bar{\rho} h$$

Gravity Button

Figure 4-13 shows some data displayed in the main window gravity graphic plot but in an easier to use format. Click **Axis** button to access the **Axis Setup** dialog (Figure 4-14) to make changes to the axis setup.

If **Auto** is checked the axis min and max range are set to values appropriate to the incoming data. If **Auto** is unchecked the operator can choose the min and max range.

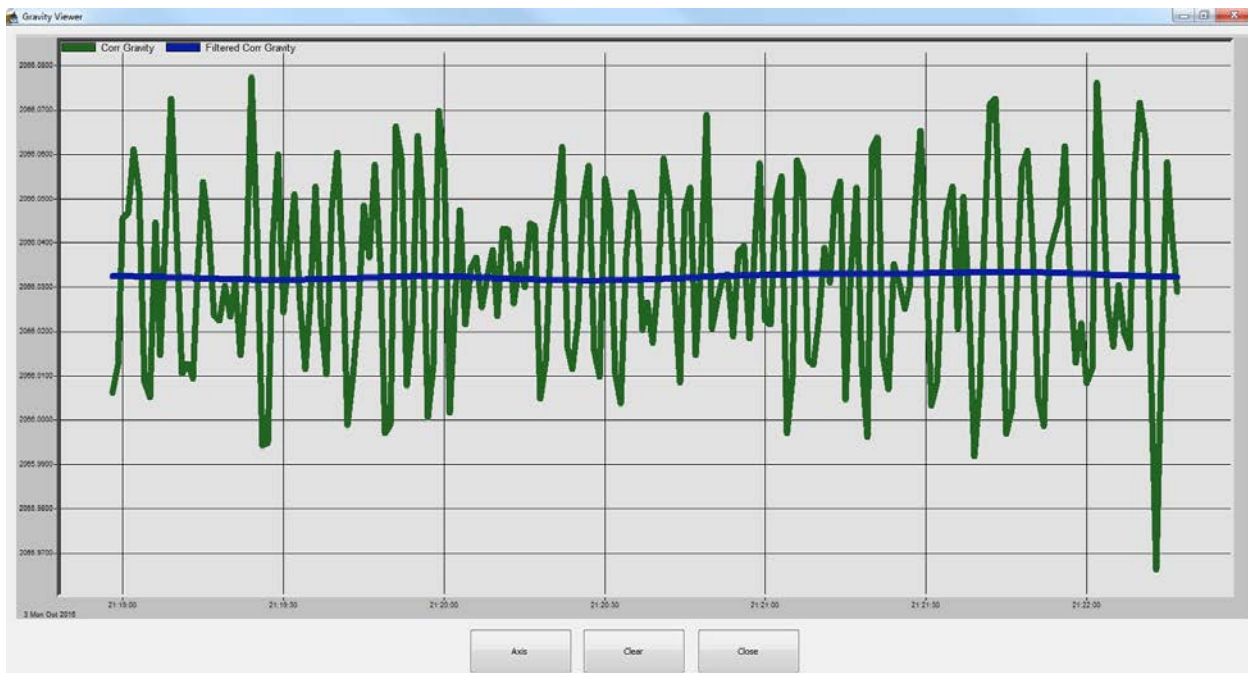


Figure 4-13 Sample Raw Gravity Plot

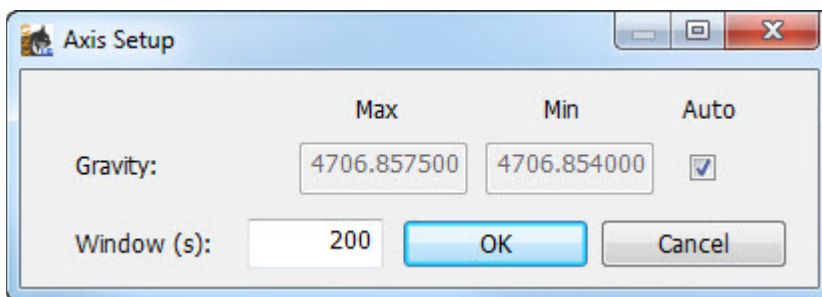


Figure 4-14 Gravity Axis Setup Dialog

Filtered Gravity

Displays filtered gravity (Figure 4-15) as configured in the **Setup** tab page (Accessed through the **Settings** button). Data point is plotted at end of the configured period. Click the **Axis** button to configure the displayed axis. Figure 4-16 show example **Axis Setup** dialog.

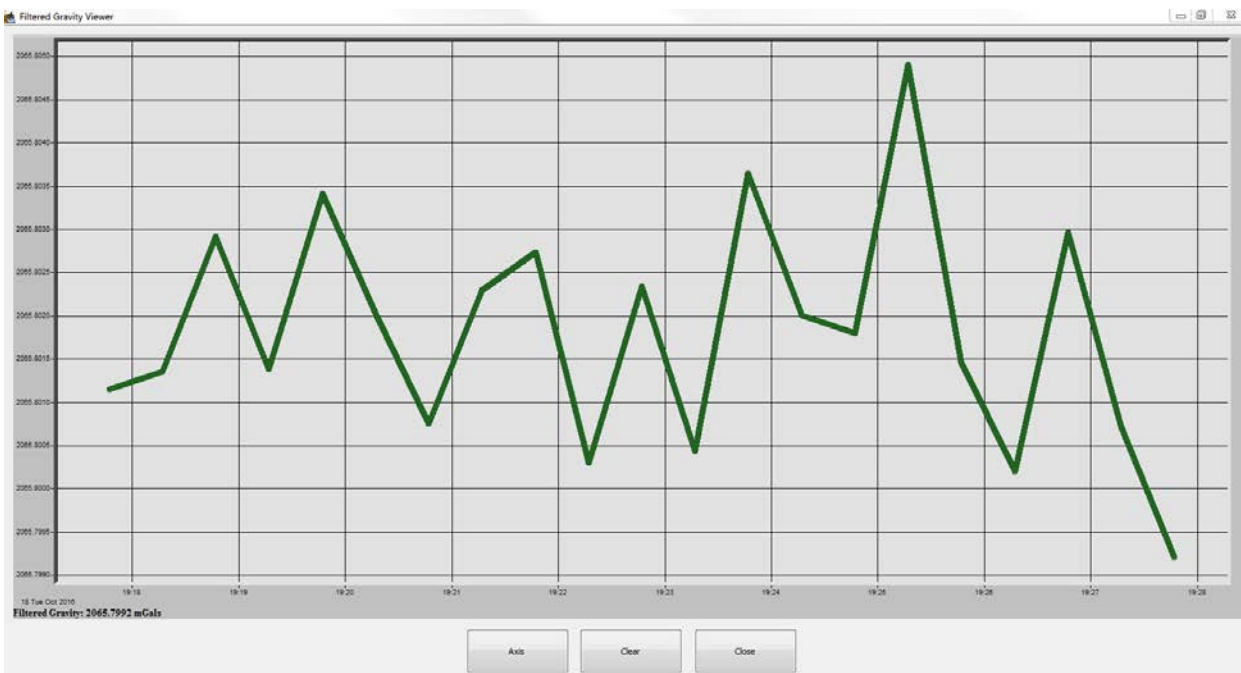


Figure 4-15 Sample Filtered Gravity Plot

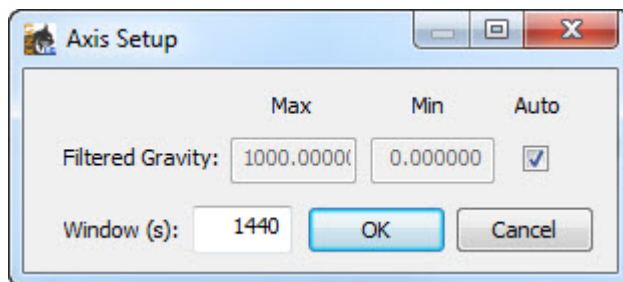


Figure 4-16 Filtered Gravity Axis Setup Dialog

Auxiliary

Click **Channels** to displays channel plot in real time of the X/Y Levels and Sensor Temperature (Figure 4-17).

Click **Corrections** to display in real time the selected corrections (Figure 4-18) plots (Level, Tide, Load, Temperature, Drift) as selected on the **Corrections** tab page accessed through the **Settings** button.

Click **Axis** to set user specified X/Y minimum/maximum values or check **Auto** to set values based on data for both Channel and Correction plots. Refer to Figure 4-19.

Clicking **Clear** clears the graphical display only and restarts the display of incoming data. Clicking **Clear** does not clear the file.

Click **Close** to close the graphical display window but does not close the file. To close file click **Stop Record** button on the main window.

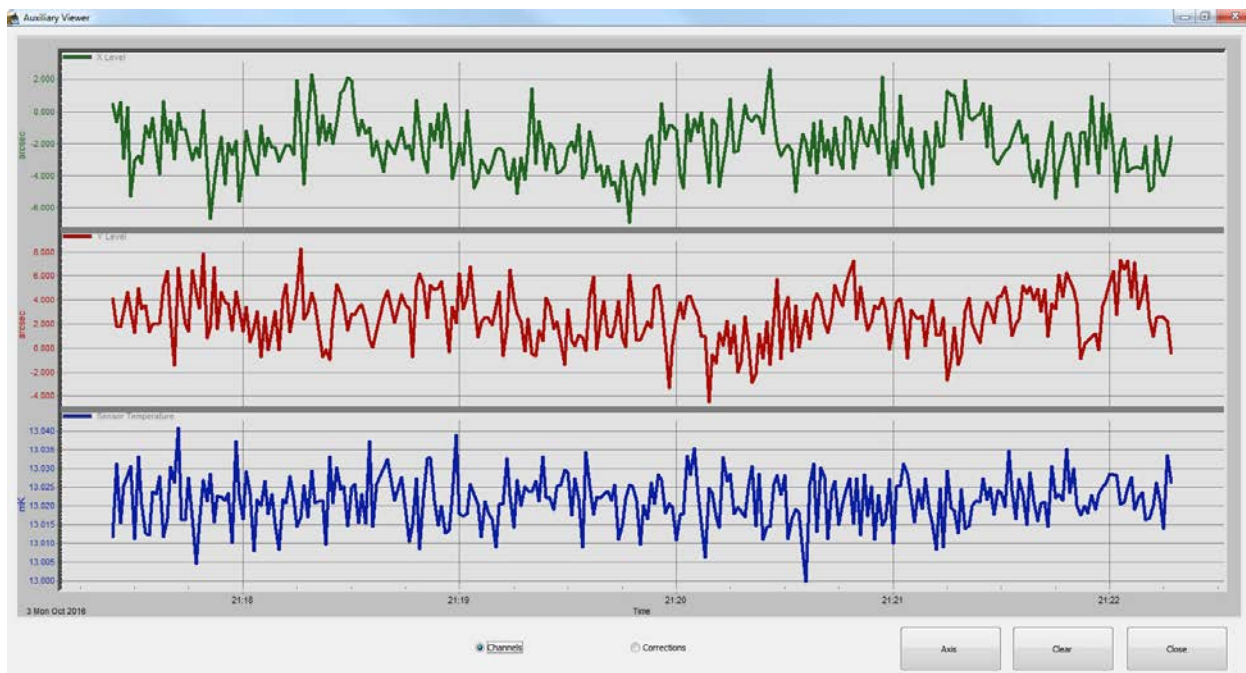


Figure 4-17 Sample Auxiliary Channel Plots

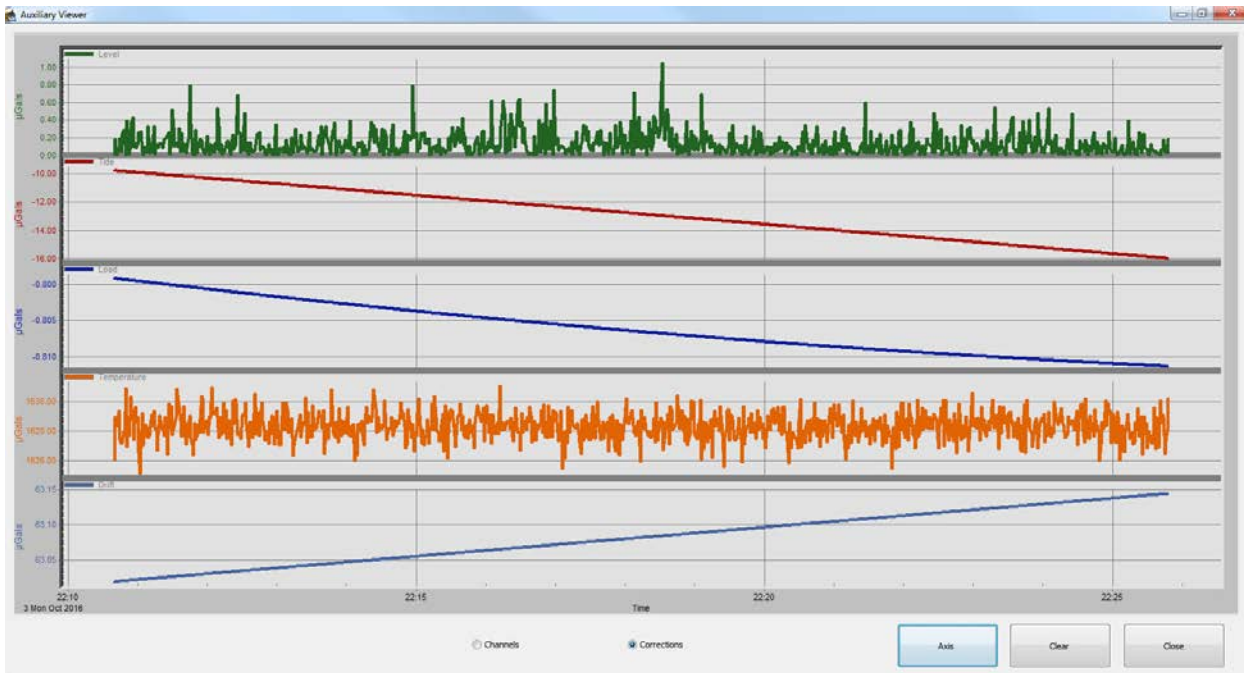


Figure 4-18 Sample Auxiliary Corrections Plots

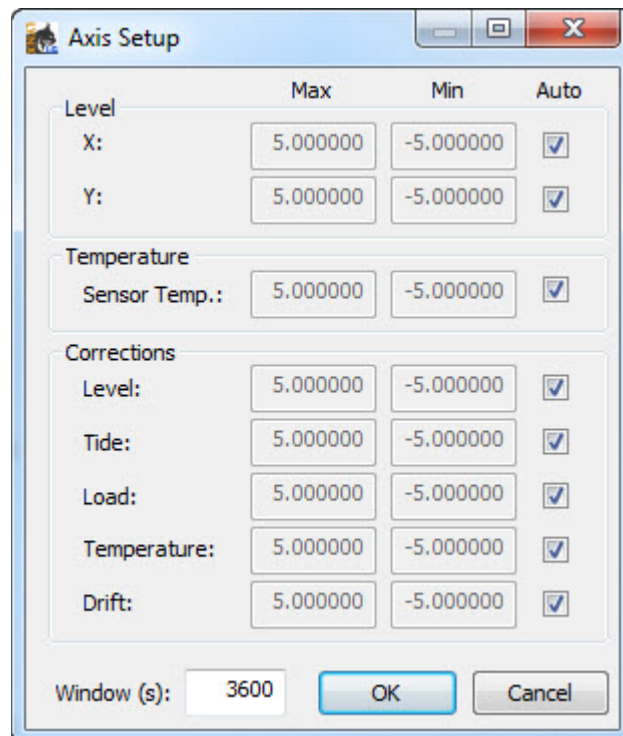


Figure 4-19 Auxiliary Axis Setup Dialog

Difference

Show difference between any two points. Select X/Y value types from the drop down list (Figure 4-20). Then click **Update** to display selections.

Click **Close** to close the graphical display window. Clicking **Close** does not close the file. To close file click **Stop Record** button on the main window.

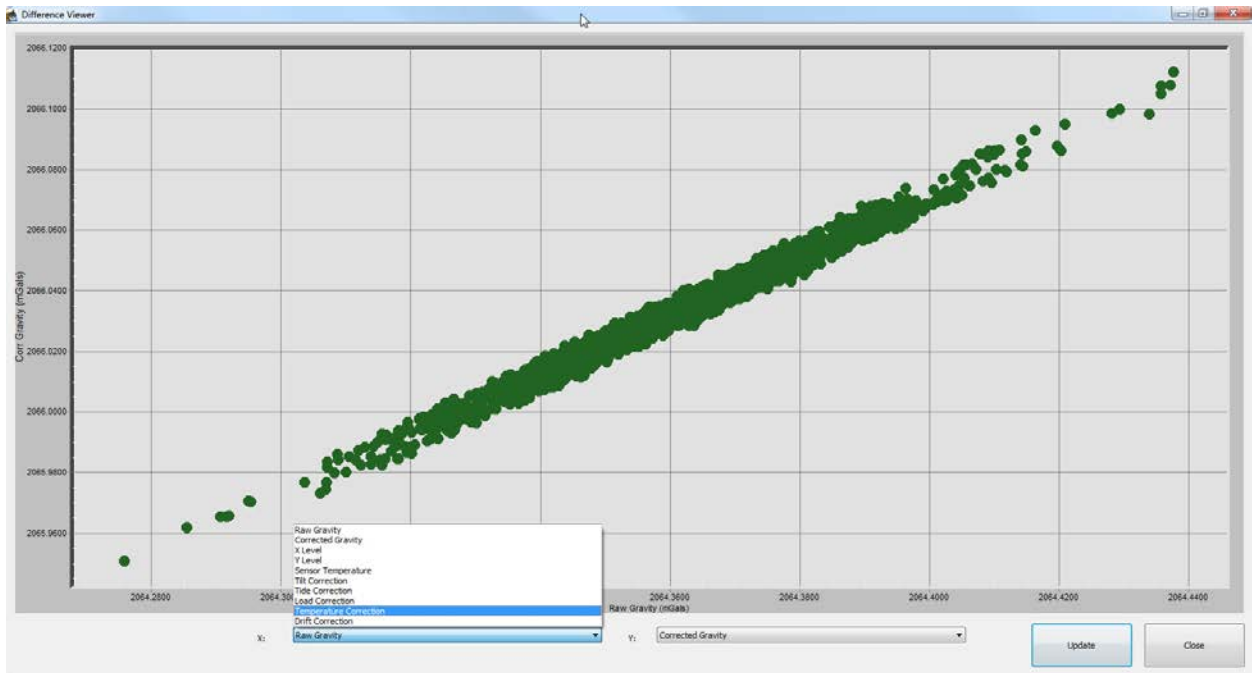


Figure 4-20 Sample Difference Plot

Trend

Trend displays a histogram (Figure 4-21) or time series (Figure 4-22) over time for the selected station.

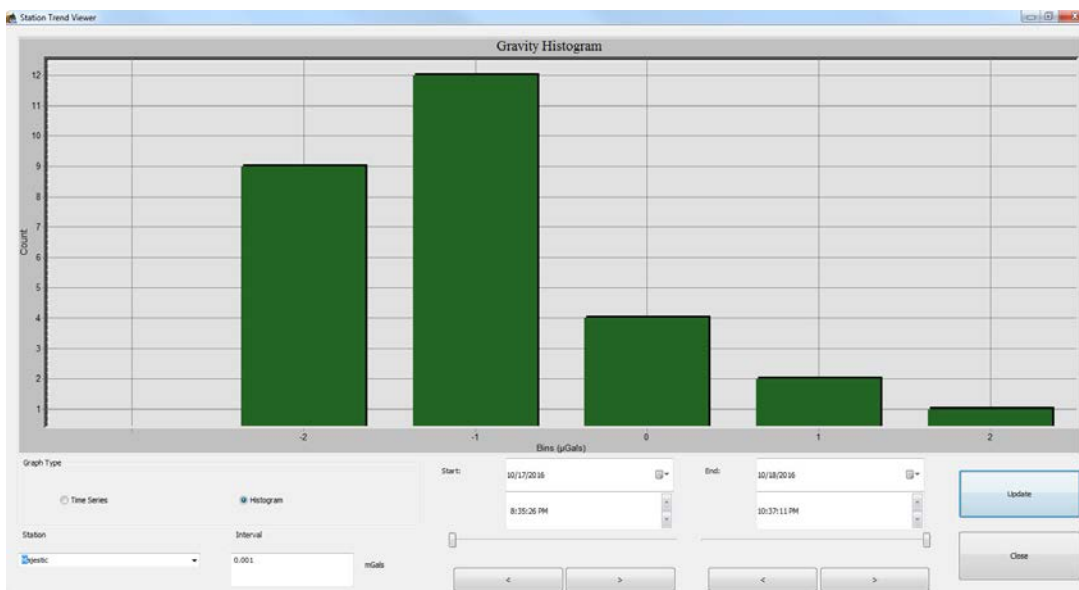


Figure 4-21 Example Trend Histogram



Figure 4-22 Example Trend Times Series

Calibrate

The **Calibrate** button allows the operator to run CG-6 calibration tests for Tilt or Drift.

It is highly recommended to check and reset the instrument levels and drift rate before a new survey begins.

The correct level positions are where the meter is vertical in both the X and Y directions. This occurs when the mean corrected gravity output is at maximum. Once this point is found an electronic offset can be applied to the levels so that they read zero when the actual sensor is level.

Tilt Calibration Test

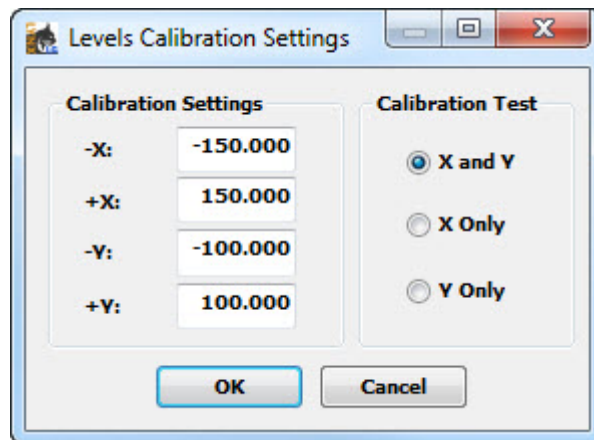


Figure 4-23 Levels Calibration Setting Dialog

Tilt XY Calibration Test

The **Tilt XY Calibration Test** option allows the operator to calibrate the X and Y tilt offsets and sensitivities. This process can take a while. During this process, the meter automatically goes through a series of steps where the X and Y tilts will be moved by the user to maximum and minimum points in both directions in order to fit for the peak angle. There are six steps in all. The user will be instructed to level the meter to a particular spot. Once leveled to that spot, the user will click OK and gravity will be measured for a set amount of time. After the set amount of time, the data is recorded and the next step begins. The user will then level the meter to the next spot and click OK. This process continues until all six steps are done. After all the steps are completed, the data is fit and the new

offsets and sensitivities are displayed. The operator can accept the new value, restart the test without accepting the values, or cancel the test without accepting the values. If the values are accepted, the settings are updated and saved to the local *.ini file. These values are critical, so do not run this calibration test unless properly trained and the meter is in a desirable test location.

Tilt X Calibration Test

During this process, the meter automatically goes through a series of steps where the X and Y tilts will be moved by the user to maximum and minimum points in both directions in order to fit for the peak angle. There are six steps in all. The user will be instructed to level the meter to a particular spot. Once leveled to that spot, the user will click OK and gravity will be measured for a set amount of time. After the set amount of time, the data is recorded and the next step begins. The user will then level the meter to the next spot and click OK. This process continues until all six steps are done. After all the steps are completed, the data is fit and the new offsets and sensitivities are displayed. The operator can accept the new value, restart the test without accepting the values, or cancel the test without accepting the values. If the values are accepted, the settings are updated and saved to the local *.ini file. These values are critical, so do not run this calibration test unless properly trained and the meter is in a desirable test location.

Tilt Y Calibration Test

The **Tilt Y Calibration Test** option allows the operator to calibrate just the Y tilt offset and sensitivity. During this process, the meter automatically goes through a series of steps where the X and Y tilts will be moved by the user to maximum and minimum points in both directions in order to fit for the peak angle. There are six steps in all. The user will be instructed to level the meter to a particular spot. Once leveled to that spot, the user will click OK and gravity will be measured for a set amount of time. After the set amount of time, the data is recorded and the next step begins. The user will then level the meter to the next spot and click OK. This process continues until all six steps are done. After all the steps are completed, the data is fit and the new offsets and sensitivities are displayed. The operator can accept the new value, restart the test without accepting the values, or cancel the test without accepting the values. If the values are accepted, the settings

are updated and saved to the local *.ini file. These values are critical, so do not run this calibration test unless properly trained and the meter is in a desirable test location.

Drift Calibration Test

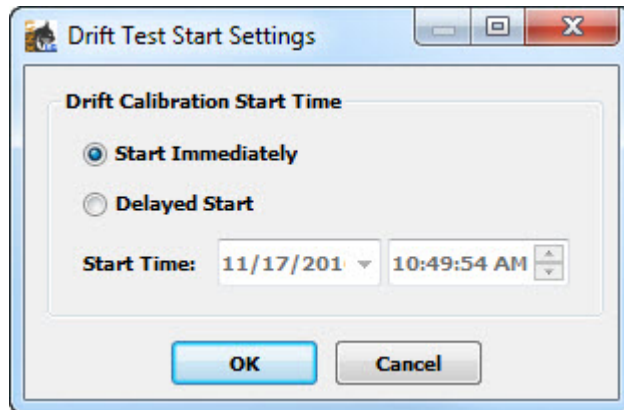


Figure 4-24 Drift Test Start Settings Dialog

The **Drift Calibration test** option allows the operator to calibrate the drift rate for the CG-6. The operator should setup the meter in quiet stable environment. The user can begin the test immediately or after a user setable delay. Once the operator is comfortable with the length of time and the results, the user can stop the test by selecting **Stop** and the new Drift rate will be calculated. If accepted, the new rate will be saved to the .ini file and on the **Corrections** tab page under the **Settings**. Scintrex recommends at least 12 hours for this test and for more accurate result, more time should be given to test the long term drift of the meter.

Controlling Graphic Displays

Double click on any graph to access a detailed options dialog to customize the graphic display style (Figure 4-25). Each tab page provides detailed customization options.

Alternatively right clicking in any graph displays menu list style of graphic options (Figure 4-26).

To save the customized settings, select **Save Graph Settings** from the LynxLG main window menu. Refer to [Section 03 "Main Window Menu Options"](#).

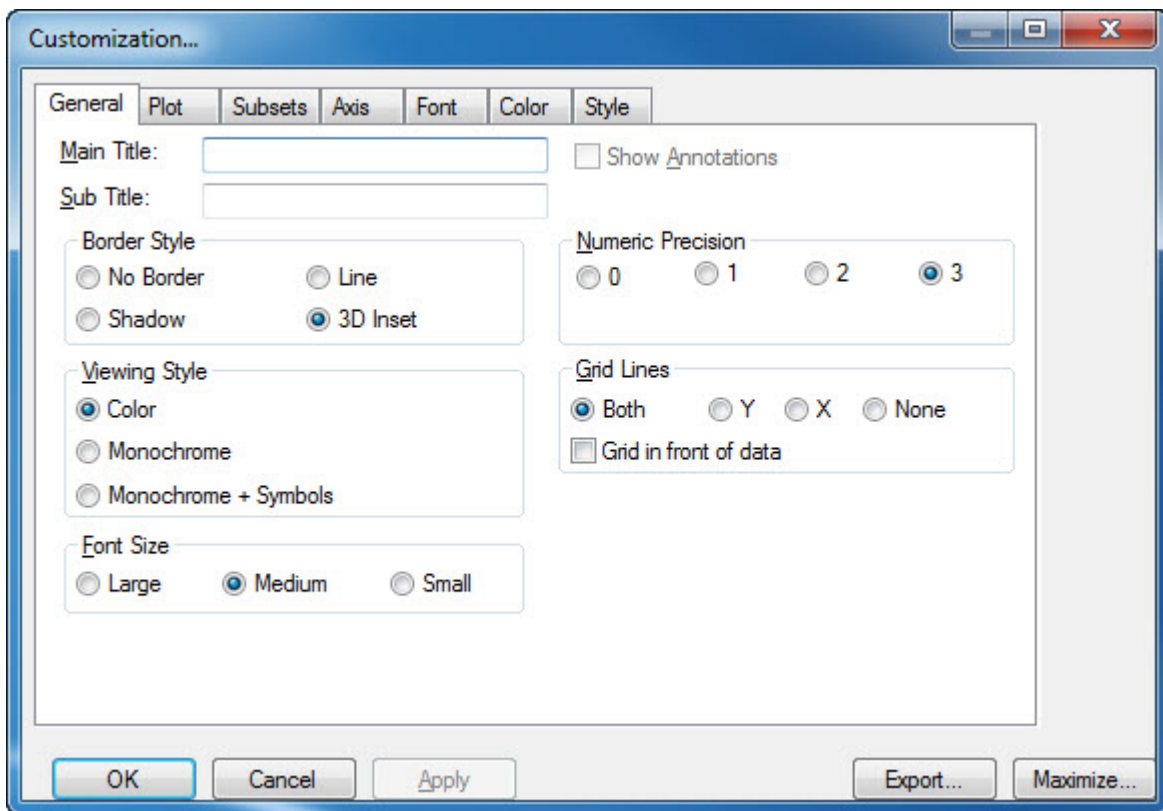


Figure 4-25 Customization Dialog

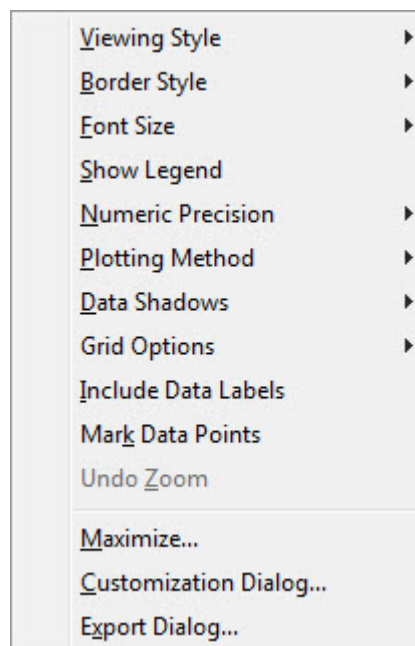


Figure 4-26 Graphic Display Menu Options



5. GRAVITY ACQUISITION SETUP

Create Station	5-1
To individually create a new station:	5-1
Add new station(s) using ACSII CSV file	5-1
Route Files	5-2
Create Route File	5-3
Order of Operation At New Station	5-6
Level Meter	5-6
Settings	5-6
Connect Button	5-7
Record	5-7
Stop Recording	5-7
Disconnect	5-7

Create Station

To individually create a new station:

- Click Settings button and go to Information Tab page.
- Enter the new station name in the **Station** text field. Station names must be unique and contain no spaces in the name.
- Enter the **Latitude**, **Longitude** (dd) and Elevation (m) on the Information tab page (minimum required information).
- Click **OK**.
- In main window, click **Connect**.
- In the **Station Information** dialog, check **New Station** (The newly created station name should be displayed). Then click **OK**. This will append the new station to the survey station index file.
- In the **Details** dialog, enter any field note, enable desired output files, and select the file format. Then click **OK**.

Add new station(s) using ACSII CSV file

New station names can be created and loaded through an acsii CSV Index file. Station names must be unique and contain no spaces in the name.

The stations are stored in each survey index file located in the gData\LynxLG_Database\

WARNING

If using the index.txt database file as base format, copy the file to a different location before editing. Do Not Edit this file in the database folder. It is a database index file that is created automatically. Copy and store this file elsewhere to use as an example base file. Use the Add Route to Station Database method to append new station names to this file to the existing database index file.

The index file must minimally contain the following information:

- List of unique station names with no spaces
- Latitude (dd +N) in decimal format
- Longitude (dd +E) in decimal format
- Elevation in meters.

To create or append to a station index file, use **Load Route** in the **Information** tab page of **Settings** to load the ascii, GPX or

KML file and select **Add Route to Station Database** to append or create a station index file. Refer to example shown in Figure 5-1. Refer to the [Route Files](#) section for addition information on route files and instructions for creating and loading route files.

WARNING

If there is an existing station name with data already collected, do not change the latitude and longitude and elevation information.

Create a new station name with the new latitude, longitude and elevation information.

```
St_01,39.979013500,-105.067571100,1577.233400000
St_02,39.980980000,-105.070380000,1577.200000000
ST_060,39.700920000,-105.239490000,2131.000000000
ST_140,39.727050000,-105.547360000,2368.000000000
ST_260,39.682780000,-105.606940000,2973.000000000
ST_080,39.711850000,-105.269940000,2254.000000000
STL_120,39.724630000,105.417560000,2393.300000000
```

Figure 5-1 Example CSV Index File

File Load

- Click on **Settings** and go to the **Information** tab page.
- Enter the survey name in the **Survey** text field.
- The **Station** drop down list should display all the stations listed in the CSV index.txt file.
- Select desired station and Click **OK**.

The station configuration and survey information about that station is displayed.

Route Files

A route is a hierarchical order of stations. The user can import a KML (Keyhole Markup Language) file or GPX (GPS Exchange Format) file, or any delimited ascii file with formatted strings that contain the required station information. This file can contain repeats of stations as well as new stations not existing in the survey station index file.

WARNING

If there is an existing station name with data already collected, do not change the latitude and longitude and elevation information.

Create a new station name with the new latitude, longitude and elevation information.

Create Route File

A route file is a file that contains the expected station route for your current survey. It can be any delimited column based ascii file that contains station and location (Latitude, Longitude, Elevation) information. The route file can also be from a KML (Keyhole Markup Language) or GPX (GPS Exchange Format) file. See online for KML and GPX file help and how they are created or formatted.

These route files will be used by Lynx LG to create a sequential route of stations that will be occupied during the current survey. The route file will be used to update the station information once a cycle has been completed.

WARNING

If using the index.txt database file as base format, copy the file to a different location before editing. Do Not Edit this file inside the database folder. It is a database index file that is created automatically. Copy and store this file elsewhere to use as an example base file. Use the Add Route to Station Database method to append new station names to this file to the existing database index file.

Load Route File

To load a route file

- Go to the **Settings Information** tab page.
- Click on **Load Route**.
- In the browser window choose an existing route file to load. (ASCII, KML, GPX File).
- Click **Open**.
- If asked, input number of header lines, number of columns, and file delimiter for current route file loaded. Refer to Figure 5-2.
- In the File Column Selection dialog (Figure 5-3) select the appropriate column for station information such as Latitude, Longitude, Elevation, Date/Time, etc.
- Select appropriate format for the route file data.

- If certain data does not exist in file, select N/A
- Select **OK** to load route file
- If loaded correctly, you will get an acknowledgment.

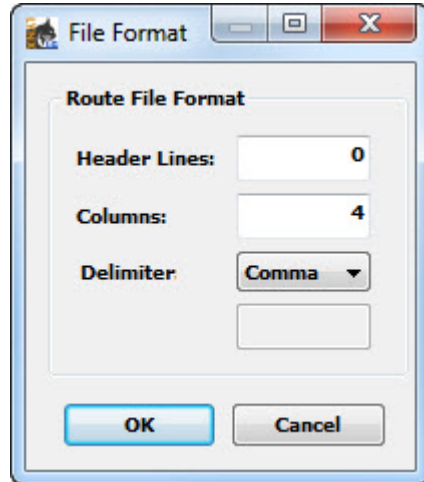


Figure 5-2 File Format Dialog

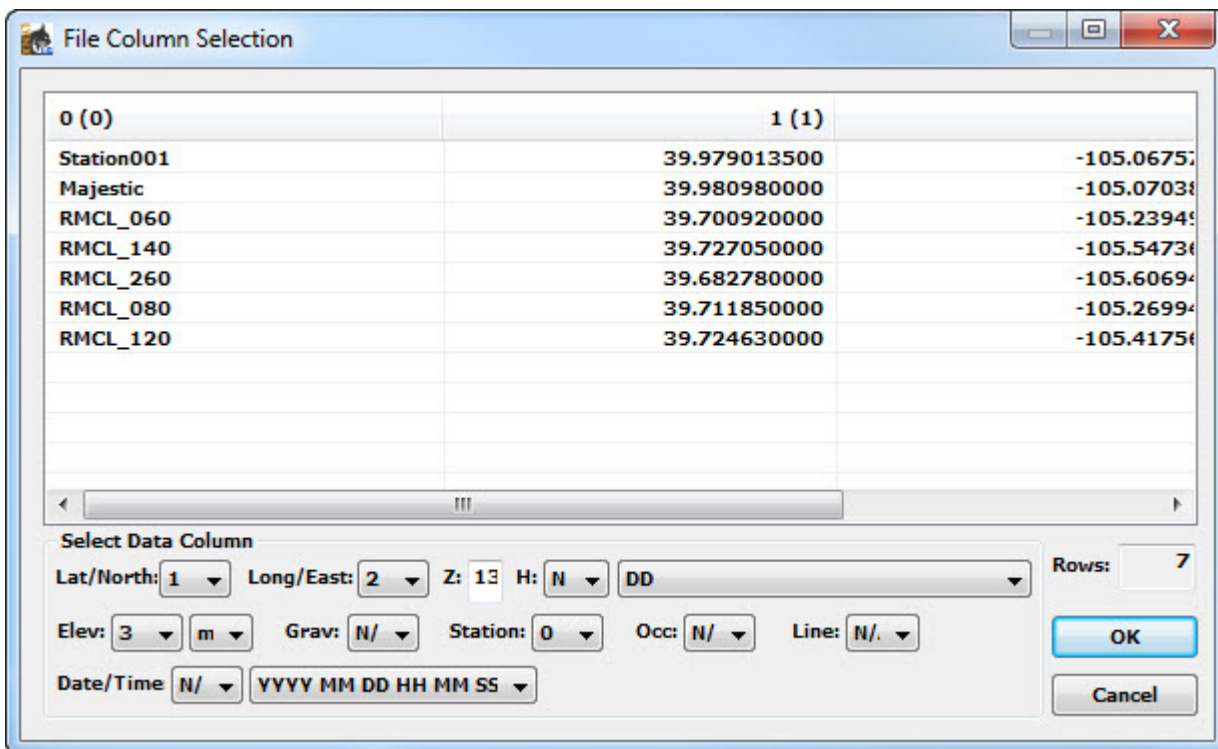


Figure 5-3 Sample File Column Selection Dialog

Navigating Route File

To navigate through loaded route file use the back <<< or forward >>> buttons in the location section of the **Information** tab page in **Settings**. This will step through the currently loaded route file. While stepping through the route file, the station information will update automatically.

Auto Increment Route

If you are using cycles for your acquisition, you can automatically increment to the next station in your loaded route file after each cycle has completed. To enable this, check **Auto Increment Route** in the Information tab.

Add Route to Station Database

You can append the unique stations in the currently loaded route file to the survey station index file. This will add new stations if they do not exist to the Lynx LG database. Once the route file is loaded, select **Add Route to Station Database** in the **Information** tab

Order of Operation At New Station

Refer to [Section 04](#) for in depth discussion and description of each of the main window functions.

Level Meter

Refer to the CG-6 Autograv™ Gravity Meter Operational Manual.

Settings

In main window, click on **Settings** then select the tab page:

Information Tab

- Select the **Survey** name and starting **Station** name.
- Load route if available
- Update Meter Name/ID and Operator information
- Update Setup information

Setup Tab

- Setup Date/Time stamp source (System is recommended)
- Configure Meter Port
- Configure GPS Port
- Set Gravity Filter and enable/disable cycles
 - If **Enable Cycles** is checked, update **Number of Cycles**
- Adjust graph limits
- Set Output File

Calibration Tab

- Make sure calibration settings on CG-6 and Lynx LG software are the same.
- Click **Get/Set Factors** button and **Set** or **Get** values as appropriate to sync calibration settings.

Corrections Tab

- Enable desired corrections
- Select desired Tidal Model and Setup to create tide files for current location. Refer to [Section 06](#) for further information on the Berger and ETGTAB corrections.
- Adjust correction coefficient if needed.
 - CG-6 sends UTC
 - Be sure computer clock is set to UTC before clicking **Set to Current Time**.

Connect Button

When setup is complete, click the **Connect** button in the main window.

- Select or enter new station name in the **Station Information** dialog, then click **Ok**.
- Choose the data output file name(s) and location in the **Details** dialog.

Record

Click **Start Tablet Record** or **CG-6 Start Rec.** button when satisfied with settings and displayed data.

Stop Recording

Click **Stop Tablet Record** or **CG-6 Stop Rec.** button when satisfied with results and ready to move to a new station

If Cycles are enabled, this will happen automatically when the cycles are completed and you will get a popup with the results of the cycle data.

Disconnect

Click **Disconnect** button to disconnect from CG-6. This is recommended when moving to a new station so that database results for recall will be updated when you start the acquisition process again.



6. CORRECTION THEORY

Gravity Corrections.....	6-1
Level Correction	6-1
Temperature Correction	6-2
Drift Correction	6-2
Tidal Correction.....	6-3
Berger	6-3
ETGTAB.....	6-6

Gravity Corrections

Lynx LG allows the operator to apply many standard corrections to the raw gravity. These corrections are turned on or off from the **Corrections** tab page (Figure 6-1) which is accessed by clicking **Settings** under the **System** menu.

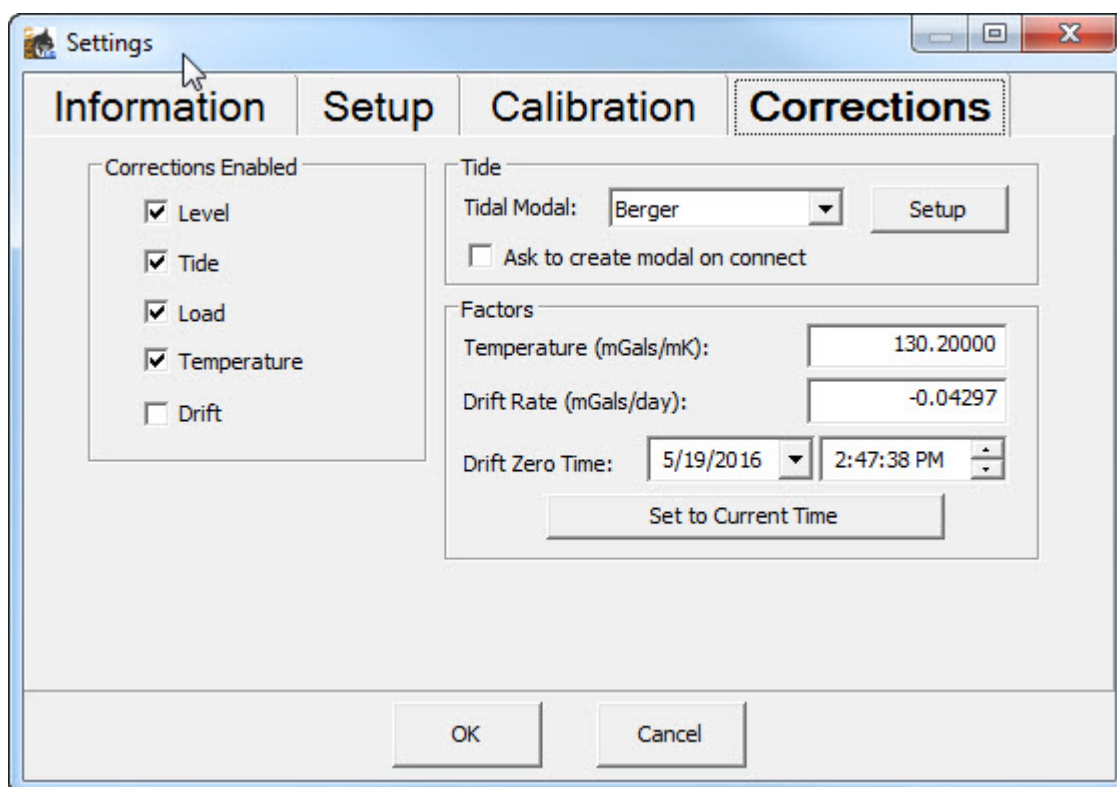


Figure 6-1 Setting: Correction Tab

Level Correction

Level correction is based on the X and Y level tilt off of vertical. This can be useful if the sensor drifts off of vertical during a reading. This correction compensates for the error in the tilt levels. When the meter is well leveled, the indicator is close to the center and the numeric values are close to zero. At the vertical position, an error of 100 analog-to-digital units is $AD \approx 1 \mu\text{Gal}$ off-level error. The formula used to compute this correction is:

$$C(1) = (1 - \cos(L(1) * A) * \cos(L(c) * B)) * D$$

where:

A = The X level calibration factor.
B = The Y level calibration factor.
D = Gravity Constant (9.806e5.
C(l) = Level Correction in mGal.
L(c) = Observed Y Level.
L(l) = Observed X Level.

The larger the off level correction the more unreliable it is.

Temperature Correction

The Temperature correction factor is based on the sensor temperature. This correction compensates for the error caused by the meter temperature changes. This correction factor is set by the factory for the Gravilog sensor and should not be changed by the user. The formula used to compute this correction is:

$$C(t) = A * T(o)$$

where:

A = Temperature factor in mGals/mK.
If this is to be applied, the operator must determine the correction factor based on the error observed. Enter the **Temperature (mGal/mK)** factor on the **Corrections** tab page accessed by selecting **Settings** under the **System** menu.
C(t) = Meter Temperature Correction in mGal.
T(o) = Observed meter temperature.

Drift Correction

This correction compensates for the long term meter drift rate. The formula used to compute this correction is:

$$C(d) = A * (D(n) - D(r))$$

where:

A = The sensor drift admittance factor mGals/day.
Once a constant drift rate is achieved, the user can calculate the drift rate in mGals/day and set it as the sensor drift rate. Enter the **Drift Rate (mGals/day)** on the **Corrections** tab page by selecting **Settings** under the **System** menu.

$C(d)$ = Drift Correction in mGal.
 $D(r)$ = Drift Time Zero.
Drift time zero is a reference point represented in seconds from January 1st 1904. It can be set by clicking **Reset Drift Time** under the **System** menu.
 $D(n)$ = Current time in seconds from January 1st 1904.

NOTE The drift correction should not be applied unless the drift has been constant for a long period of time.

If the raw gravity indicates a drift with a significant nonlinear term, do not apply a drift correction.

Tidal Correction

The effect of lunar-solar mass attraction is computed and applied to the observations. A gravimetric factor (usually 1.16) is used to compute the effect of tidal uplift on the continental crust due to the mass attraction of the sun and moon. Lynx LG allows for two types of Tidal Corrections

- Berger – Originally written by Jon Berger in 1969 and modified by several others throughout the years.
- ETGTAB – Originally compiled by the late Georg Wenzel, ETGTAB uses a more sophisticated calculation.

The Lynx LG software accommodates two Tide Correction methods, ETGTAB and Berger. Within each it is possible to incorporate an Ocean Loading model. Most operators should use the modern ETGTAB routine, but the Berger model is provided for completeness.

The amplitude and the phase of the gravity loading are computed using the Farrell's method. The Green's functions for the PREM model are used and a correction for the mass conservation is included. The operators may choose different ocean tides models. Details of the choices and options are discussed below.

Berger

In the Berger correction, the tidal parameters are set using a constant delta factor of 1.1554 and a phase Kappa of zero. This delta factor cannot be modified except for the DC term (Honkasalo correction). The tidal potential is also set once for all.

The gravity body tide is computed and applied to the observations. The program used for this computation was originally written by Jon Berger, November 1969, and was modified by J. C. Harrison, Judah Levine, and Karen Young, University of Colorado; Duncan Agnew, University of California San Diego (IGPP); and Glenn Sasagawa, NOAA.

To create the ocean load file.

- From Lynx LG main window, click **Setting**.
- Select **Corrections** tab.
 - Set Tidal Model to Berger, then click Setup.
 - Leave **Ask to create model on connect** to create immediately or check to create on connection.
- Click **Setup** to launch **Berger Setup** dialog (Figure 6-3).
 - Set **Ocean Loading** to **On**.
 - Browse to select ocean load file location.
 - Click **Run Ocean Load** to access the **Ocean Load** dialog.
 - Click **OK**.
- In the **Ocean Load** dialog (Figure 6-4) enter:
 - Base Name
 - Output (output file location)
 - Wavefile Directory (default location C:\gData\gWavefiles\)
 - Click **Setup** to access the **Load Terms** dialog (Figure 6-5).

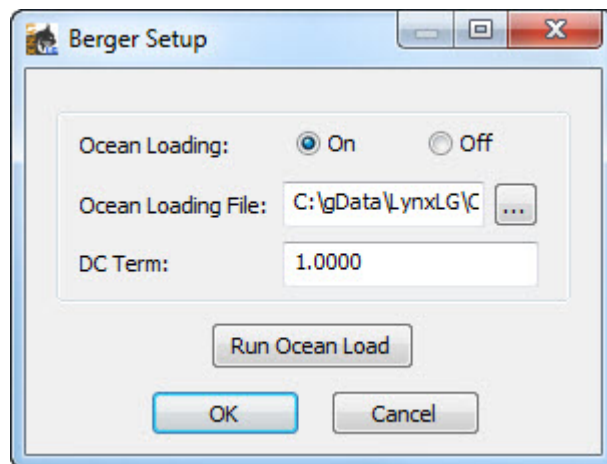


Figure 6-2 Berger Setup Dialog

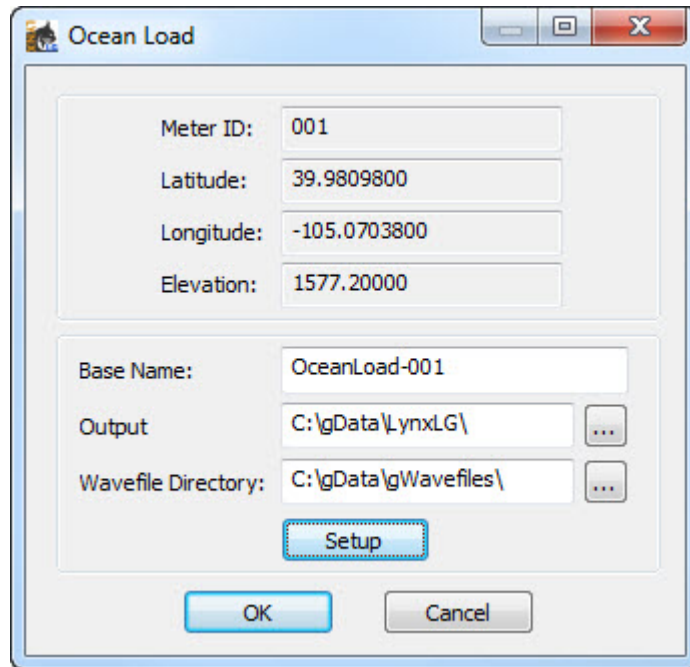


Figure 6-3 Berger Ocean Load Dialog

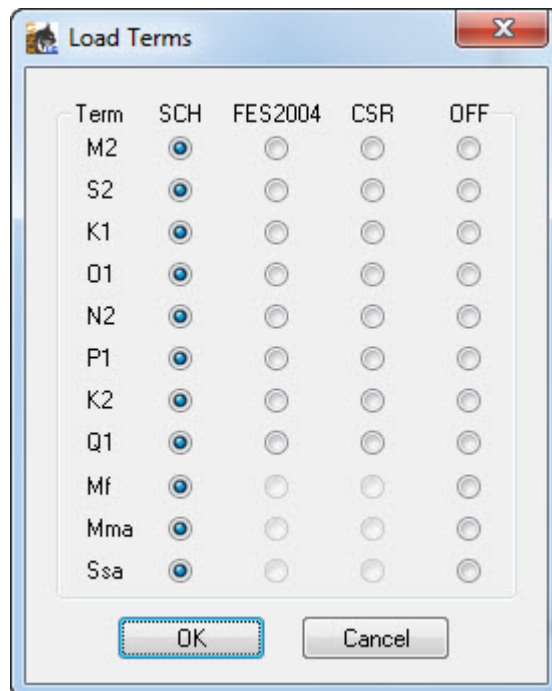


Figure 6-4 Load Terms Dialog

ETGTAB

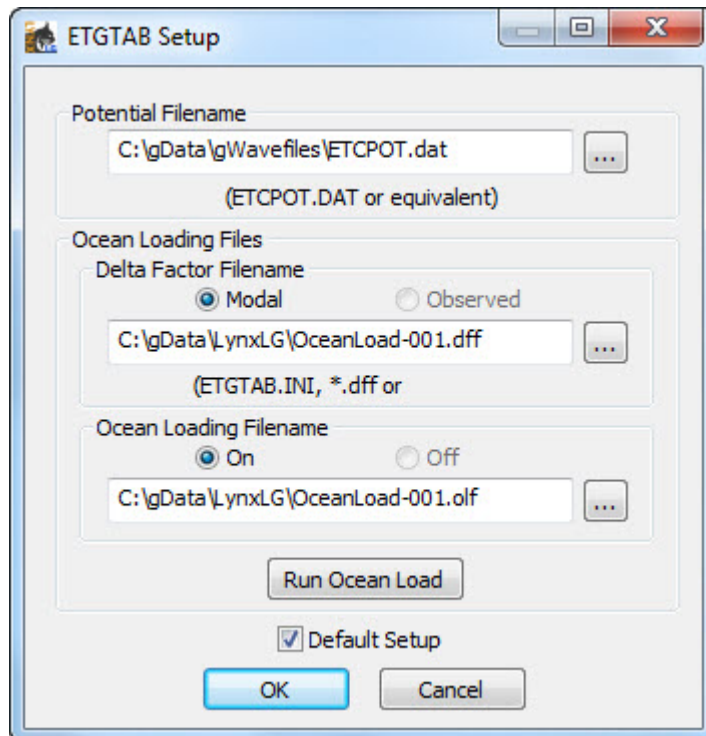


Figure 6-5 ETGTAB Setup

If **ETGTAB** is selected from the drop down list box, the **Setup** button displays the **ETGTAB Setup** dialog (Figure 6-6). The dialog has two separate sections, **Potential Filename** and **Ocean Loading Files**.

Potential Filename

ETCPOT

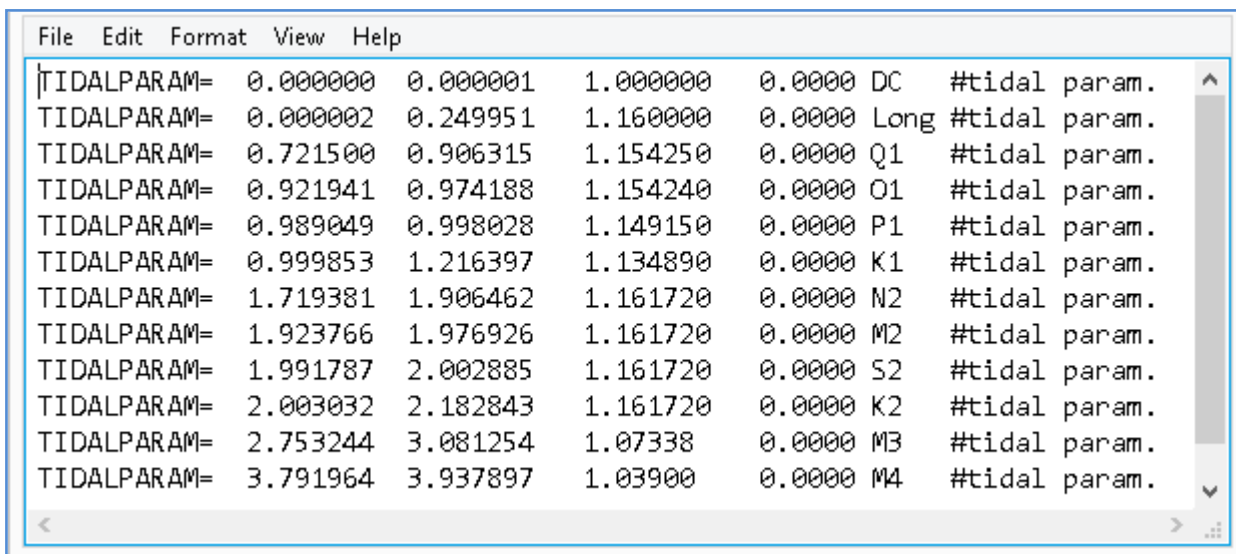
The first section allows the operator to enter the tidal generating potential file. For most operators this file is called ETCPOT.dat and is located in the gWavefiles directory. The default file contains Tamura's potential

Tidal Parameters Filename

This file can be supplied by the operator, or generated on on the fly. An example format of the file is shown in Figure 6-7. The default setup for Lynx LG is enabled by checking the **Default Setup** box at the bottom of the **ETGTAB Setup** dialog.

The **ETGTAB.INI** or ***.dff** file is generated by checking **Model** radial button in the **Ocean Loading Files** section. This setup does not contain any ocean loading component.

If the operator has a compatible model or observed tidal parameters for the gravity station, the **Default** button may be unchecked and, if applicable, the **Observed** radio button checked in the **Ocean Loading Files** section.



```

File Edit Format View Help
TIDALPARAM= 0.000000 0.000001 1.000000 0.0000 DC #tidal param.
TIDALPARAM= 0.000002 0.249951 1.160000 0.0000 Long #tidal param.
TIDALPARAM= 0.721500 0.906315 1.154250 0.0000 Q1 #tidal param.
TIDALPARAM= 0.921941 0.974188 1.154240 0.0000 O1 #tidal param.
TIDALPARAM= 0.989049 0.998028 1.149150 0.0000 P1 #tidal param.
TIDALPARAM= 0.999853 1.216397 1.134890 0.0000 K1 #tidal param.
TIDALPARAM= 1.719381 1.906462 1.161720 0.0000 N2 #tidal param.
TIDALPARAM= 1.923766 1.976926 1.161720 0.0000 M2 #tidal param.
TIDALPARAM= 1.991787 2.002885 1.161720 0.0000 S2 #tidal param.
TIDALPARAM= 2.003032 2.182843 1.161720 0.0000 K2 #tidal param.
TIDALPARAM= 2.753244 3.081254 1.07338 0.0000 M3 #tidal param.
TIDALPARAM= 3.791964 3.937897 1.03900 0.0000 M4 #tidal param.

```

Figure 6-6 Example Delta Factor File Format

NOTE An “Observed” Gravimetric Delta and Kappa Factors File contain the Ocean Loading component and therefore the OceanLoading Filename option is disabled automatically.

OceanLoad Loading Files

Lynx LG software comes with an included tool for calculating OceanLoading. Two files are created by the OceanLoad tool:

Delta Factor File

“Oceanload.dff”. This ASCII text file contains the listing of start frequency, end frequency, the Delta factor amplitude and phase (in degrees) in a format compatible with ETGTAB. This file can only be used with the ETGTAB option.

Ocean Loading File

“Oceanload.olf”. This ASCII text file contains the ocean load parameters (Wave, Amplitude and Local Phase listing). The file has an “olf” extension by default and can be used with Berger or ETGTAB options.

It is recommended that the base name “Oceanload” be modified to something unique for the current instrument location. With Lynx LG, the meter name and number is automatically appended to the basename of “Oceanload”.

For example, the Oceanload files for meter CG6 01 are named “Oceanload-CG601”. This name can be altered for a different location.

Lynx LG uses the information from the **Setup** page to get all the data that it needs to create the OceanLoading files. The values it uses are:

- Name (Meter name and number for the Lynx LG project file)
- Latitude (Latitude of the site)
- Longitude (Longitude of the site)
- Elevation (Mean Sea Level elevation for the site)

The ocean tide files are supplied to Micro-g LaCoste by Dr. Olivier Francis, <http://www.ecgs.lu>.

Run Ocean Load: Advanced Users

For advanced users, clicking **Run Ocean Load button** (Located at the bottom of the **ETGTAB Setup** dialog) launches the **Ocean Load** dialog. Refer to Figure 11-4. Clicking the **Setup** button allows the selection of three common ocean tide models for each term. Refer to Figure 11-5.

- Schwiderski
- FES2004
- CSR3.0

Users unfamiliar with these wave file models should accept the default values.

NOTE

The FES2004 model is considered state of the art, but due to the high resolution of the model it can take a few minutes to calculate the ocean load.

For quick setup purposes the default model is still that of Schwiderski.

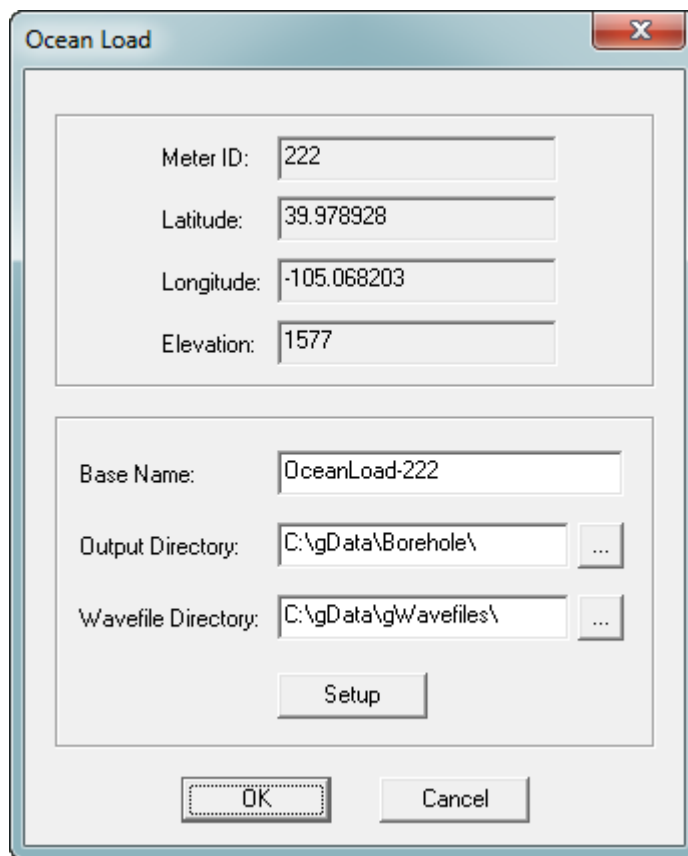


Figure 6-7 Ocean Load Dialog

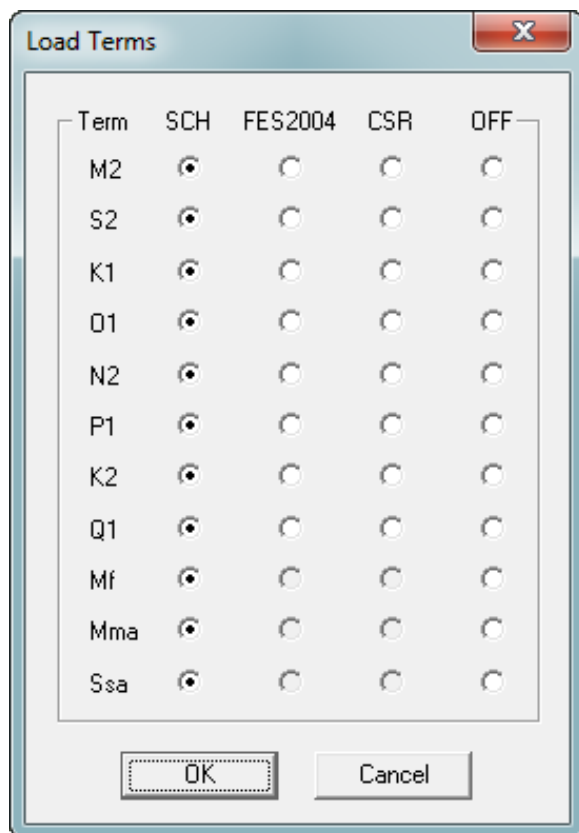


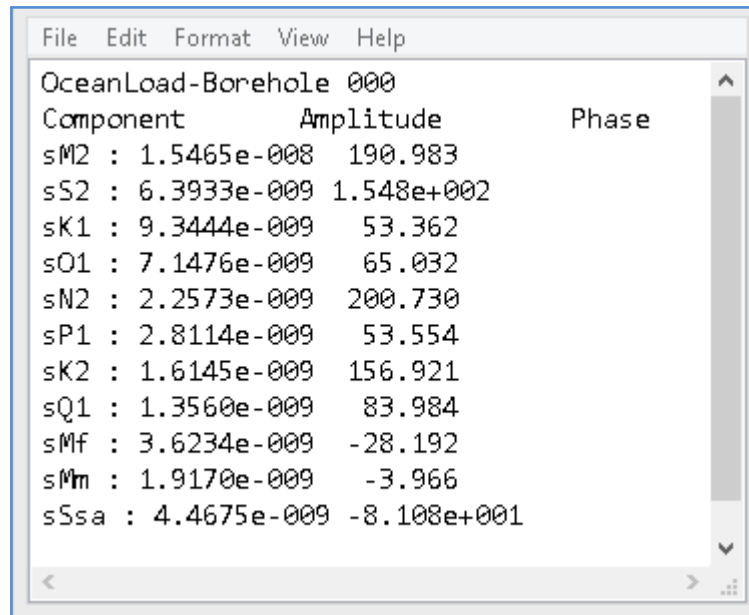
Figure 6-8 Load Terms Dialog

Existing OceanLoad Files

Lynx LG allows operators to use already existing OceanLoad files, as well. To use existing files, enable OceanLoad by clicking the check box in the Setup option, and then search for the specified .olf and .dff files.

OceanLoading Format

As discussed above, depending on the information (modeled versus observed) contained in the tidal parameters file, an Ocean Loading file may or may not be entered. The format of the Ocean Loading file is shown in Figure 6-10. Users may generate this file using the OceanLoad tool as explained above, or from their own data source.



Component	Amplitude	Phase
sM2	1.5465e-008	190.983
sS2	6.3933e-009	1.548e+002
sK1	9.3444e-009	53.362
sO1	7.1476e-009	65.032
sN2	2.2573e-009	200.730
sP1	2.8114e-009	53.554
sK2	1.6145e-009	156.921
sQ1	1.3560e-009	83.984
sMf	3.6234e-009	-28.192
sMm	1.9170e-009	-3.966
sSsa	4.4675e-009	-8.108e+001

Figure 6-9 Example Ocean Load file Form



7. LICENSE, SUPPORT AND MAINTENANCE

License	7-1
Support	7-1
Maintenance	7-1

License

Licensed users of Lynx LG software are entitled to three install platforms with the Main License. Additional installations, including support, are purchased one seat at a time directly from Scintrex/Micro-g LaCoste. If your institution or company requires Lynx LG software to run on more than three platforms, please contact Scintrex directly or visit our website, or <http://www.scintrexltd.com> or <http://www.microglacoste.com> for more information.

Support

Questions concerning the operation of the Lynx LG software and any problems using Lynx LG software should be directed to:

info@microglacoste.com

You can expect to receive an email or phone call within 48 hours of your inquiry.

Maintenance

Periodically Scintrex posts an upgrade or patch for the Lynx LG software on the Scintrex website. Patches and Upgrades are posted without notification so please check back periodically to get the latest patch if applicable or directed by Scintrex/Micro-g LaCoste.



APPENDIX A TROUBLESHOOTING

Tip Num	Problem/Error Message	Solution
1	Graphic customization seems revert back to default settings	To save customized graphic settings, access the menu from the Lynx LG main window. Click on the LynxLG icon in the upper left hand corner and select Save Graph Settings . Then check the graph that you want saved when closing the Lynx LG software. To revert back to the defaults, uncheck the Save Graph Settings graph option.
2	Position Map displays a black screen.	It may be lack of internet connect or No maps were download to C:\OfflineMaps. For maps download instructions refer to Section 04 "Download Map" .
3	Station and Survey name list displayed in the Information tab page under the Settings button display appear to be incorrect.	Do not manually edit the files in the C:\gData\LynxLg_Database folder. Make a copy of the index file in a user created folder to create a route file to import into Lynx LG. New station names must not contain any spaces. Refer to Section 05 "Create Route File."
4	Warning pop-up "Could not initialize the library properly"	It indicates the library did not load. Just close and restarted computer/tablet and open Lynx LG software again.
5	Click Connect on the tablet and nothing happens.	Make sure the Bluetooth connection is connected and activated. Or can mean the incorrect COM port selection or COM port settings. Refer to Section 02 "Lynx LG Software Buletooth Device Setup."
6	Bouguer Map fails to display	The station file did not contain sufficient gravity information. There must be at least four or more stations to generate a Bouguer map.
7	No survey directory exists. Popup error message "Survey directory does not exist."	It either means it is a new survey with no station data or the master .ini file was copied to a different computer and database does not yet exist. Go to the Information tab page in Settings and enter the survey name in Survey . At first connection the database is recreated.

