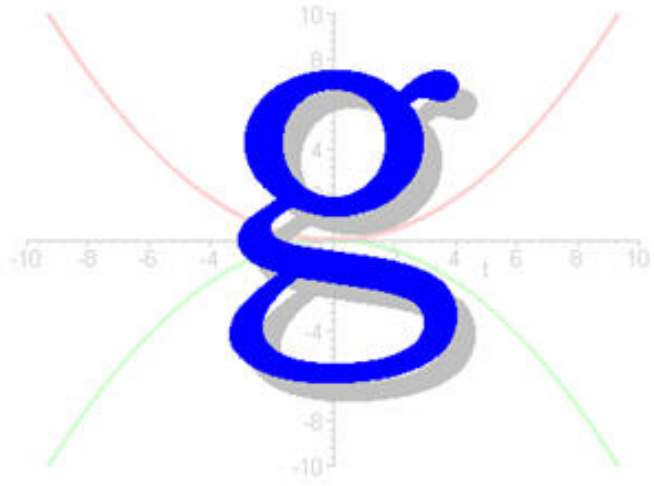
MICRO g LACOSTE
A DIVISION OF LRS

g-software
Absolute Gravity
Data Acquisition
And
Processing Software version 9
User's Manual



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Applicable Products
Micro-g LaCoste FGL, FG5 Absolute Gravimeter

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1. INTRODUCTION

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This manual details the operation of the Micro-g LaCoste g-software Absolute Gravity Data Acquisition and Processing Software package. Information covered in this manual includes:

- Real time set up instructions of the g-software.
- Details site and instrument specific parameters.
- Provides information about the control of the environmental and instrumentation corrections.
- Post-processing considerations.
- Detailed description of the tidal routines and advanced software functions.

The g-software package provides sophisticated data collection and processing and analysis capabilities, including standard environmental gravity corrections necessary for µGal gravity measurements. It allows the user to customize the data acquisition program for each site including geodetic coordinates, delayed start-up, set and drop rate and other detailed site information. Additionally the software provides real time plot capabilities and statistical analyses giving users a clear understanding of the gravity data.

The g-software Absolute Gravity Data Acquisition and Processing Software (g-software) operates in the Windows® environment and is designed to work with all Micro-g LaCoste (MGL) absolute gravimeters, including the FG5(X), A-10, FGL gravimeters, and is capable of processing older, archived data collected with most Olivia versions after being converted to the g format using the included “Convert” application.

Users familiar with previous version of the g-software (g8), Olivia, or absolute gravity data acquisition will find the software easy to use and operate. Those new to absolute gravity measurements should read this user's manual carefully before operating any MGL absolute gravimeter or post-processing any absolute gravity data.

System Requirements

The g-software relies on both text and graphical output to assist users in quickly evaluating instrument performance and results. The software runs best with the following minimal standards:

Operating System:	Windows 98, 2000, NT, XP, Vista, Windows 7
Free Hard Drive Space:	1 GB or greater
RAM:	512 MB or greater
Processor:	Intel™ P3 or greater
Processing Speed:	1 GHz or greater

How g-software Software Processes Gravity Data

This manual assumes the user is familiar with the operation of a Micro-g LaCoste freefall gravimeter. An object is dropped in a vacuum and a laser interferometer is used to accurately track the freefall. The precise timing of optical fringes (which provide distance information) allows the acceleration of gravity, g, to be determined.

The g-software communicates with the Time Interval Analyzer (TIA) card in the computer to record the precise time of the zero crossing of the optical fringes. Plotting the distance as a function of time results in the expected parabolic curve. The precise formula is:

$$\left.\begin{aligned} x_i = x_0 + v_0\tilde{t}_i + \frac{g_0\tilde{t}_i^{\,2}}{2} + \frac{\gamma x_0\tilde{t}_i^{\,2}}{2} + \frac{1}{6}\gamma v_0\tilde{t}_i^{\,3} + \frac{1}{24}\gamma g_0\tilde{t}_i^{\,4} \\ \tilde{t} = t_i - \frac{(x_i - x_0)}{c} \end{aligned}\right\}$$

The complications arise due to the fact that the gravity gradient cannot be neglected and that the path length of one of the interferometer arms is decreasing. This latter effect is sometimes referred to as the “speed of light” correction. The g-software uses least-squares fit to calculate the best fit of the (x_1, t_1) data to the above equation. The free parameter of interest is g, the acceleration.

This determines the best estimate of the absolute value of g at the beginning of the drop.

However, to be a truly useful value, a series of corrections are usually performed. There are both environmental and instrument considerations that need to be accounted for.

Environmental Considerations

Transfer Height Correction.

This transfers the gravity value from the height of the top of the drop (which can change from setup to setup and from instrument to instrument) to a more convenient value.

Barometric Pressure Correction.

As the local air pressure changes, so will the measured gravity value due to direct attraction. By comparing the current pressure with the standard local value, the gravity value can be corrected to better estimate the value on a “normal” day.

Earth Tide and Ocean Load Corrections.

As the earth changes shape due to solar and lunar attraction, and as the mass of the oceans deform the earth’s crust, the local value of g changes by hundreds of µGals. Through empirically derived formulas, these effects can be minimized to estimate the expected average value of g for any given time at the current location.

Polar Motion Correction.

As the earth wobbles on its axis, the local centripetal acceleration changes the local value of g. By entering parameters related to the earth’s current orientation, this effect can be corrected.

Instrumental Considerations

Reference X_0 Correction.

The mechanics of the dropping system are such that it cannot return exactly to the same height each time. However, X_0 is one of the free parameters in the equation of motion. Using this value to normalize all of the drops to the same height is technically necessary. Note however, that this correction is insignificant and is usually on the order of 0.01µGal.

Laser Wavelength

The wavelength of the laser may change over the course of time, or may “hop” to a new value mid-measurement. The software needs to be able to account for this.

Document Conventions

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

2. INSTALLATION

You have either received a Compact Disc media or you have downloaded the g-software Setup file from the Micro-g LaCoste website:

http://www.microglacoste.com.

- Completely uninstall all previous versions of the g-software Absolute Gravity Data Acquisition And Processing Software.
- Double click Setup.exe.
  - Follow the instructions.
  - It is highly recommended that you accept all the default installation paths.

NOTE During installation: "f" means file and "d" means directory in the instructions.

- When starting g-software for the first time, it will prompt you to create a small binary file, “SysChk.bin” that is unique to your computer.
- Email SysChk.bin file to Aaron Schiel at aaron@microglacoste.com or Derek van Westrum at derek@microglacoste.com.
  - Wait to receive the PWinfo.bin file.
  - During normal the business week, this usually takes less than twelve hours.

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

- Upon receipt of GPWInfo.bin:
  - Run g-software again.
  - Follow the program’s instructions to install the password file.

You are now ready to run the g-software.

IMPORTANT Due to software protection in g-software, a new password file (GPWInfo.bin) is required if any hardware changes (new or removed) are made to the g-software computer. Follow the above steps to obtain a new GPWInfo.bin file.

3. REAL-TIME DATA ACQUISITION

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The g-software allows both real-time data acquisition and post-mission processing.

Data Acquisition Process Steps

Start Data Acquisition Project

- From the main g-software window, click **New** on the **Project** menu.
- The software pop-up **Micro-g** dialog indicates that starting from a completely new project is generally not desired. (See Figure 3-1) It is better to start with an existing project with gravity meter settings obtained from another project or template. See Section 07 "Save As A New Template" for additional information.
- Click “Yes” to continue.

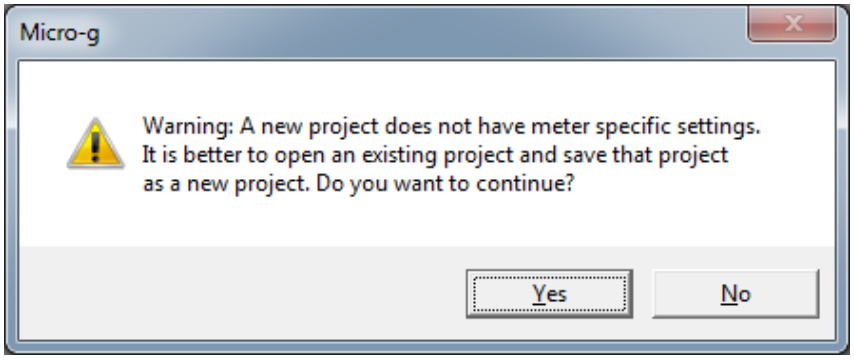


Figure 3-1 Example New Project Warning Message

- The four default screens are displayed. Refer to Figure 3-2.
  - There is no information in the left **Project** navigation panel.
  - By default, g-software is set to run an FG5 instrument at the Micro-g LaCoste facility.

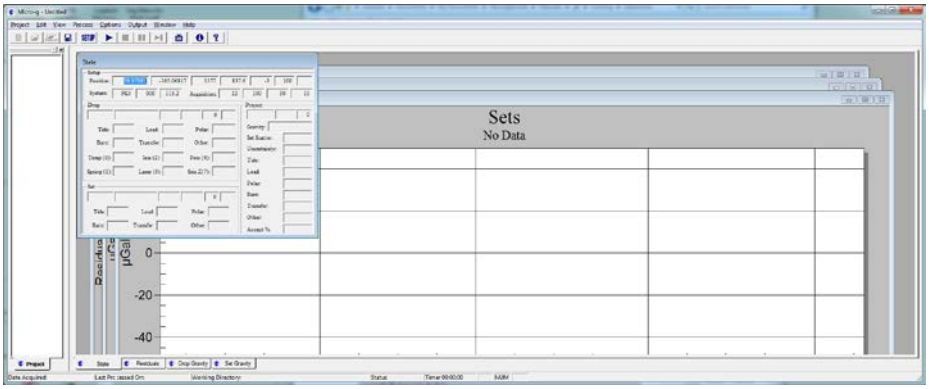


Figure 3-2 g-software Main Window: Four Default Screens

g-Software Setup

To set the g-software up for data acquisition and processing at your location, you must modify some or all of the parameters for each of the tab pages in the **Setup** dialog. See modification details for each of the tab pages below.

- To access the **Setup** dialog go to the **Process** menu option and click **Setup**.
- The **Setup** dialog has five tab pages: Information, System, Acquisition, Control and Comments. Refer to Figure 3-3.

Information Tab

The **Information** tab displays setup options for the instrument location. Figure 3-3 displays an example setup dialog for the **Information** tab. Refer to Table 3-1 for descriptions of each of the setup options.

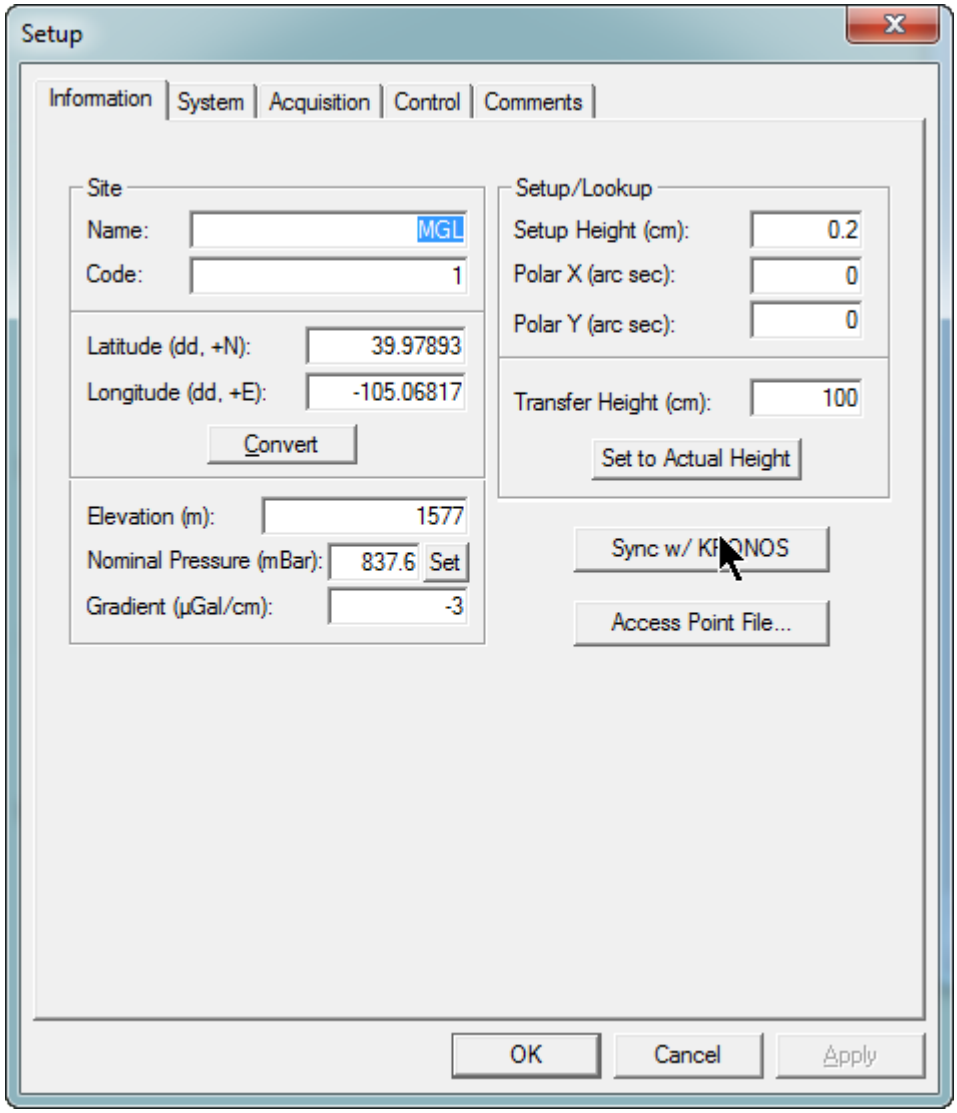


Figure 3-3 Setup Dialog: Information Tab Displayed

Table 3-1 Setup: Information Tab Options Description

Site Section	
Name	(Site Name) Free form text.
Code	(Site Code) Free form text.
Latitude (dd, +N)	In decimal degrees (dd)
Longitude (dd, +E)	In decimal degrees (dd)
Convert Button	Converts Degree/Minutes/Second (DMS) coordinates or Universal Transverse Mercator (UTM) coordinates to decimal degrees (DD). An example **Convert** Dialog is shown in Figure 3-4.
Elevation (m)	Meters above sea level.
Nominal Pressure (mBar)	The long term, mean pressure value at the site, which is generally not the current pressure value.
Gradient (µGal/cm)	Vertical Gravity Gradient. Normally negative. If unknown, the standard free air value is -3.09 µGal/cm.
Setup/Lookup Section	
Setup Height (cm)	Measured Setup Height. This changes from setup to setup.
Polar X (arc sec)	Polar motion X and Y components. These need to be updated approximately once per week. Current values are always available at http://microglacoste.com
Polar Y (arc sec)	
Transfer Height (cm)	The height that the gravity value is reported at. Typical values are 0, 100, 130° cm. The gradient value is used to transfer the gravity value calculated at the top of the drop (different for each instrument) to the requested transfer height. **NOTE** In previous versions of the g-software, the “Setup Height” was referred to as the “Reference Height” and the “Transfer Height” was referred to as the “Datum Height”. The name changes were done for the purposes of clarity.
Sync w/KRONOS	Used to synchronize the computer time, latitude and longitude with the KRONOS box. The KRONOS box has to be locked to a valid GPS signal for proper synchronization.
Access Point File	Used to access or manipulate point files. Point files contain site/day specific information. If this information is known ahead of time, the user can create point files with this information. Point files can be used to speed up software setup time. The point files contain Site Name, Site code, Latitude, Longitude, Transfer Height, Elevation, Pressure, Gradient, Polar X and Polar Y. An example Point Load dialog is shown in Figure 3-5.

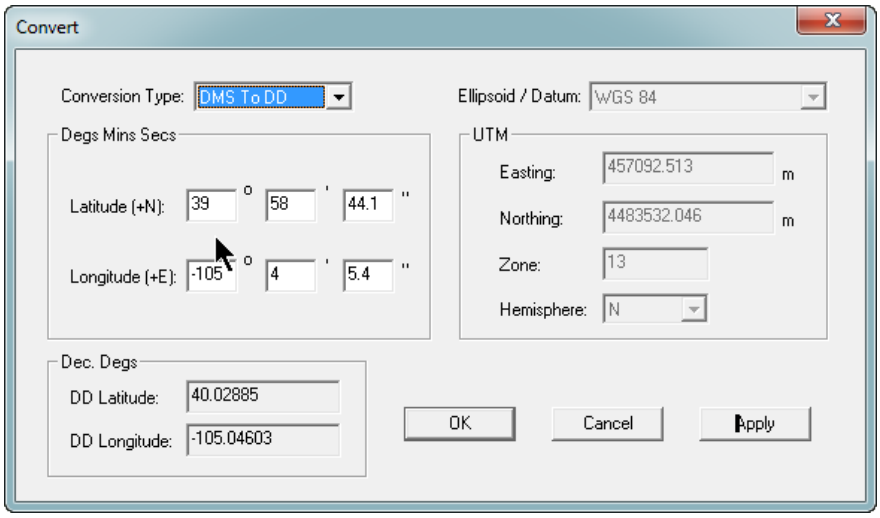


Figure 3-4 Convert Dialog

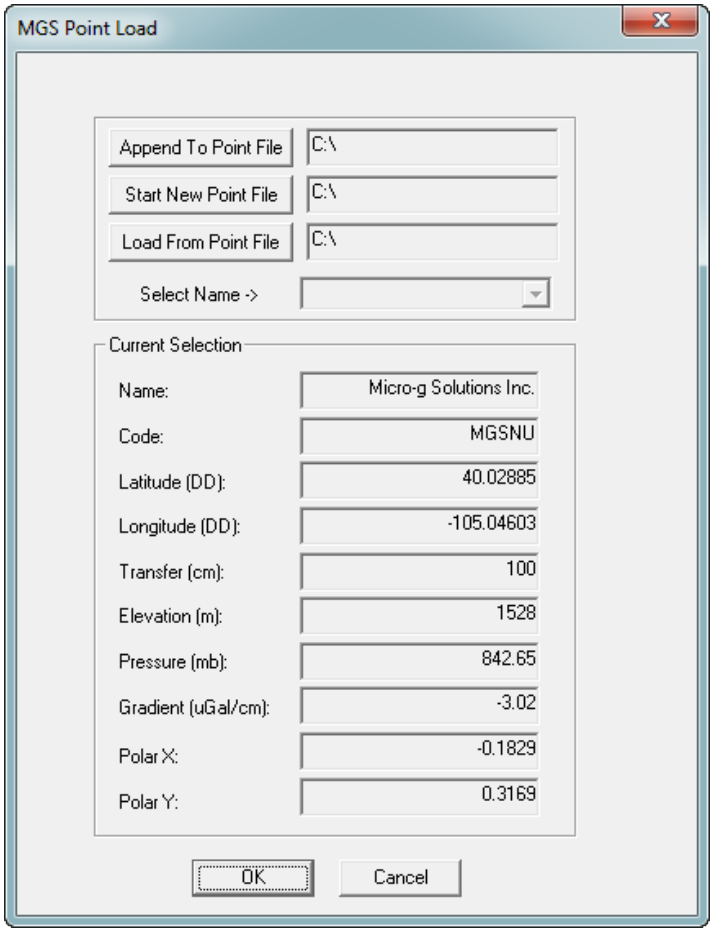


Figure 3-5 Access Point File Dialog

System Tab

An example of the System Tab dialog is shown in Figure 3-6 and options description are listed in Table 3-2.

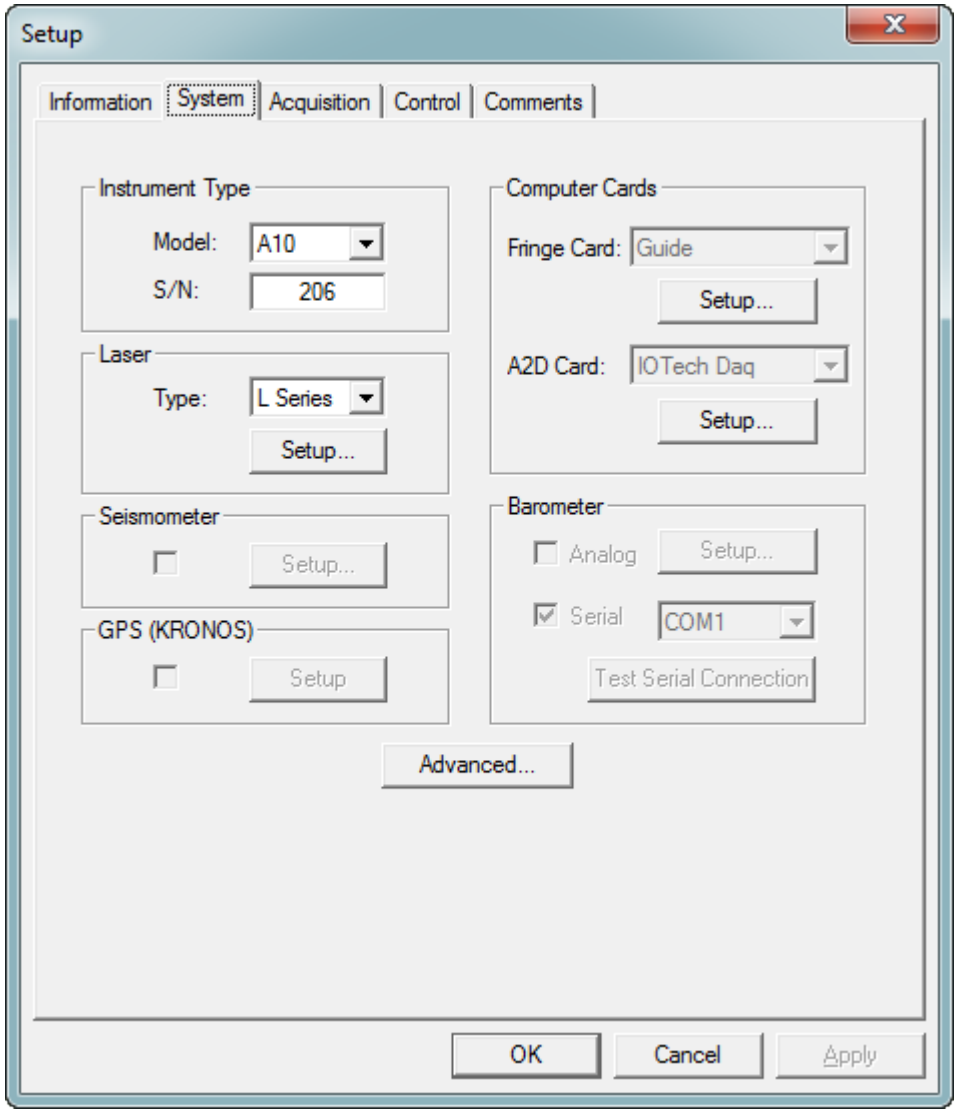


Figure 3-6 Setup Dialog: System Tab

Table 3-2 Setup Dialog: System Tab Options Description

Instrument Type Section	
Model	Select FG5, A10 or FGL. Certain options are enabled or disabled according to the instrument selection.
S/N	Enter the serial number for note keeping purposes.
Laser Section	
Type	Select the laser type and parameters associated with the laser. **WEO 100** • Laser Voltage Enter the 1F voltages for each peak, DEFG (it is not necessary to enter values for H, I or J if the measurement begins with peak D, E, F, or G selected). The software uses this voltage to determine the laser peak in use. Refer to the Instrument operator's manual for more information. • Wavelengths In general, it is never necessary to change the laser wavelength. Users are highly discouraged from editing the laser wavelengths, unless for testing purposes. These should be considered fixed. • Serial Number. Enter the serial number for note keeping purposes. • Modulation Frequency The Modulation Frequency is unique to each WEO 100 laser. This must be entered accurately to x,xxx.xxx decimal places. **WEO 200** • Wavelength • Serial Number. Users are highly discouraged from editing the laser wavelengths, unless for testing purposes. These should be considered fixed. **ML-1** • Blue Lock • Red Lock • Wavelength Refer to the information provided with your instrument for the wavelength values. The Blue and Red Lock, Wavelength and Warm-up Mode are unique to each ML-1 laser, and must be entered accurately to xxx,xxx,xxx decimal places. Do not change these values unless told to do so. This directly affects the calculated gravity value. • Warm-up Mode. Warm-up mode is typically be about 60 seconds. This refers to the amount of time before data acquisition that the laser enters lock mode.

	• Serial Number Enter the serial number for note keeping purposes.
Seismometer Section (Prototype FGL Only)	
Setup button	Check the Seismometer check box then click on **Setup.** **Seismometer Type** Users may select from a variety of seismometer options supported by Micro-g LaCoste. **Sampling Frequency** Users may enter the sampling frequency. Recommend sampling frequency is 10xCutoff. **Sampling Time** Users may enter the amount of time to sample. Recommended sampling time is 200ms for small dropping chambers.
GPS (KRONOS) Section	
Setup button	Check the GPS (KRONOS) check box then click on **Setup.** This allows the user to set the serial communication parameters with the Kronos unit, as well as test the connection. The defaults should not need to be modified.
Computer Cards Section	
Fringe Card	Currently Micro-g LaCoste only supports the GuideTech ISA or PCI GT650 series time interval analyzer in real time acquisition. The **Setup** button allows the user to: • Change the default location of the GuideTech configuration file. • Configure the base address of the card. • Change the Input Multiplexor and Scale Factor • Change number of fringes to acquire. Recommended parameters for an FG5, A10 or FGL are: • FPG File = c:\Program Files\Guide\GT650\FPGA\gt65x2.fpg • Address = 0 • Input Multiplexor = 4 • Pre Scale = 250 (FG5), 100 (A10/FGL) • No. Fringes Acquired = 700
A2D Cards	Currently the g-software software supports the IOTech 200 (ISA) or 2000 (PCI) series A2D boards and the National Instruments PCI-6013 A2D board and Serial communication. The **SETUP** button allows the user to set the acquisition parameters for each channel. For the standard Micro-g LaCoste configuration, these parameters should be for Channel(s) as shown in Table 3-3.

Barometer Section	
Analog	This configuration is handled as Channel 4 in the A2D Setup. This is standard for all analog barometers
Serial	Older FG5s employed barometers that communicated serially with the system controller. This dialog box controls the serial communication settings.
Test Connection Button	This tests the communication with the serial barometer.
Advanced	Clicking the **Advanced…** button at the bottom of the **System** tab page in the **Setup** dialog displays the **Advanced** dialog and should only be used by knowledgeable users. Refer to Figure 3-7 to see an example of the **Advanced** dialog. The dialog options are describe in Table 3-4.

Table 3-3 A2D Cards: Acquisition Parameters For Each Channel

Channel	Acquisition Parameter	Channel Setting
0	Temperature	UniPolar, 1.25V, 0, 100
1	Super Spring	BiPolar, 1.25V, 0, 1
2	Ion Pump	BiPolar, 5V, 0, 1
3	Laser Voltage	BiPolar, 5V, 0, 1
4	Barometer	UniPolar, 10V, 0, 1
		Serial Barometer, 0, 68.947
		Analog, 537.5, 125
5	User Sensor	BiPolar, 5V, 0, 1
6	User Sensor	BiPolar, 5V, 0, 1
7	User Sensor, Laser Lock or Seismometer	BiPolar, 0.3125V, 0, 1

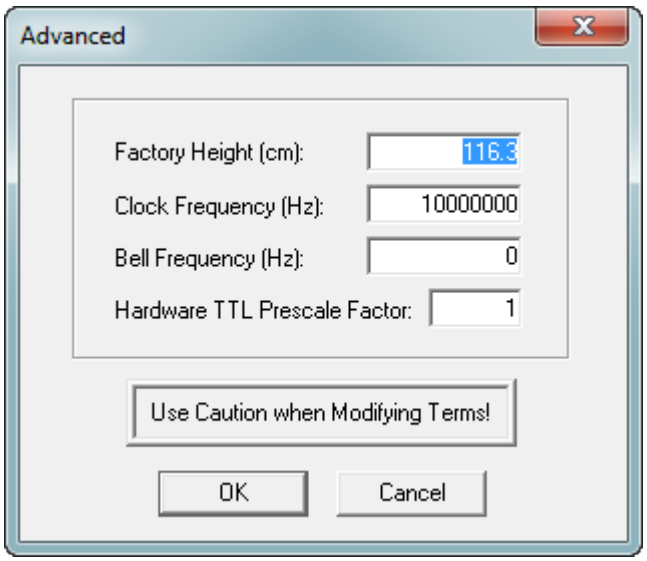


Figure 3-7 System Tab: Advanced Dialog

Table 3-4 Advanced Dialog Options Description

Factory Height (cm)	• Instrument specific and set only by Micro-g LaCoste. • This is the sum of all the internal hardware heights and is measured at the factory. • Refer to your instrument materials for a precise value.
Clock Frequency (Hz)	• Nominally 10 MHz. • Calibrated by Micro-g LaCoste or a standards laboratory. • The precise value is unique to your instrument
Bell Frequency (Hz)	• Determined by Micro-g LaCoste • Typically this value is 0 for FG5 and FGL, and A10. • Refer to your instrument materials for the correct value.
Hardware TTL Prescale Factor	• Determined by Micro-g LaCoste. • Typically this value is 1 for FG5 and FGL, and 4 for A10. • Refer to your instrument materials for the correct value.

Acquisition Tab

The Acquisition dialog setup page is shown in Figure 3-8 and the setups options are described in Table 3-5.

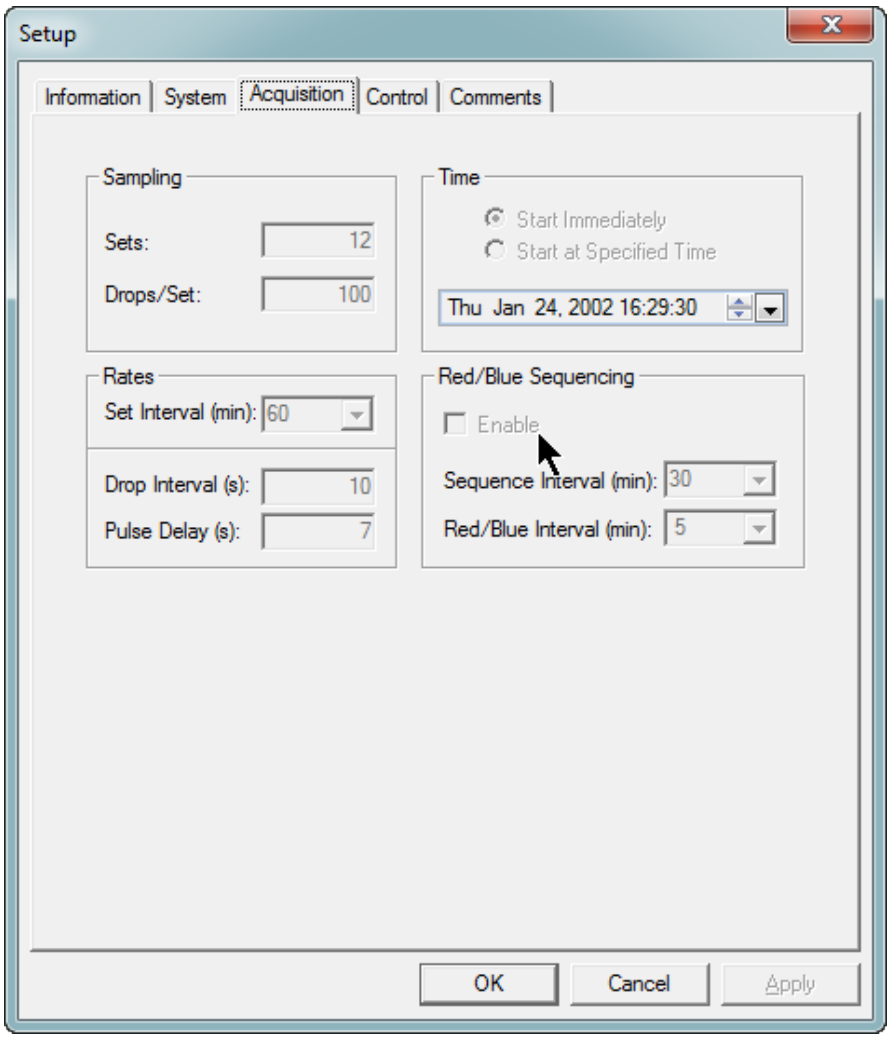


Figure 3-8 Setup Dialog: Acquisition Tab Page

Table 3-5 Setup Dialog: Acquisition Tab Options Description

Sampling Section	
Sets	Enter the number of sets to acquire during the project.
Drops/Set	Enter the number of drops in each set during acquisition.
Time Section	
Start Immediately	When **Start Immediately** is selected, clicking **Go** under the **Process** menu (or pressing the shortcut key, **F5**) immediately starts data acquisition.
Start at Specified Time	When **Start at Specified Time** is selected, the software begins data acquisition on the day and time specified. **NOTE** Time on the PC Clock must be set to Coordinated Universal Time (GMT) with daylight savings disabled, not local time.
Rates Section	
Set Interval (min)	The **Set Interval** is used to select the interval in minutes to start new sets. The drop down menu contains some commonly used intervals.
Drop Interval(s)	The **Drop Interval** sets the drop rate interval in seconds. Recommended rates are system-dependent, consult the system manual.
Pulse Delay(s)	The **Pulse Delay** is the amount of time in seconds between the drop and the time the object is lifted in preparation for the next drop. Systems with digital controllers need much less time to lift than do systems with analog controllers. An approximate value is set automatically by the g-software.
Red/Blue Sequencing Section	
Enable check box	Checking the **Enable** box enables the red/blue sequencing. It allows users with L Series lasers to acquire data with both laser frequencies in a short time interval and still spread the entire project over a longer time interval. Example: Data can be acquired with the red mode and then a few minutes later with the blue mode. Then, after an hour, the whole red/blue sequence can begin again. Figure 3-9 shows and example of the Red/Blue Sequencing Acquisition Mode.
Red/Blue Interval (min)	Select the time interval between the start of a red set and the start of the next blue set. Typical interval is a few minutes.
Sequence Interval (min)	Select the time interval between the start of two red sets.

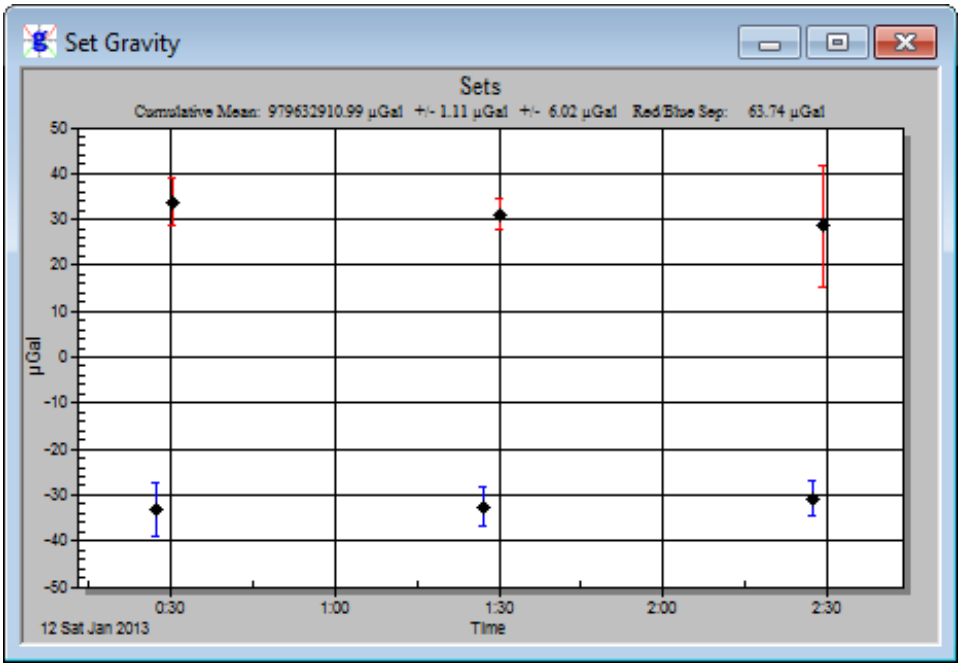


Figure 3-9 Example Of Red/Blue Sequencing Acquisition Mode.

Control Tab

The Control dialog setup page is shown in Figure 3-10. The nine subsections (Corrections, Tidal Correction, Laser, System Response Compensation, Uncertainty, Drop Fit, Fit Sensitivity, Spectrum, Bottom, Seismometer) are described below.

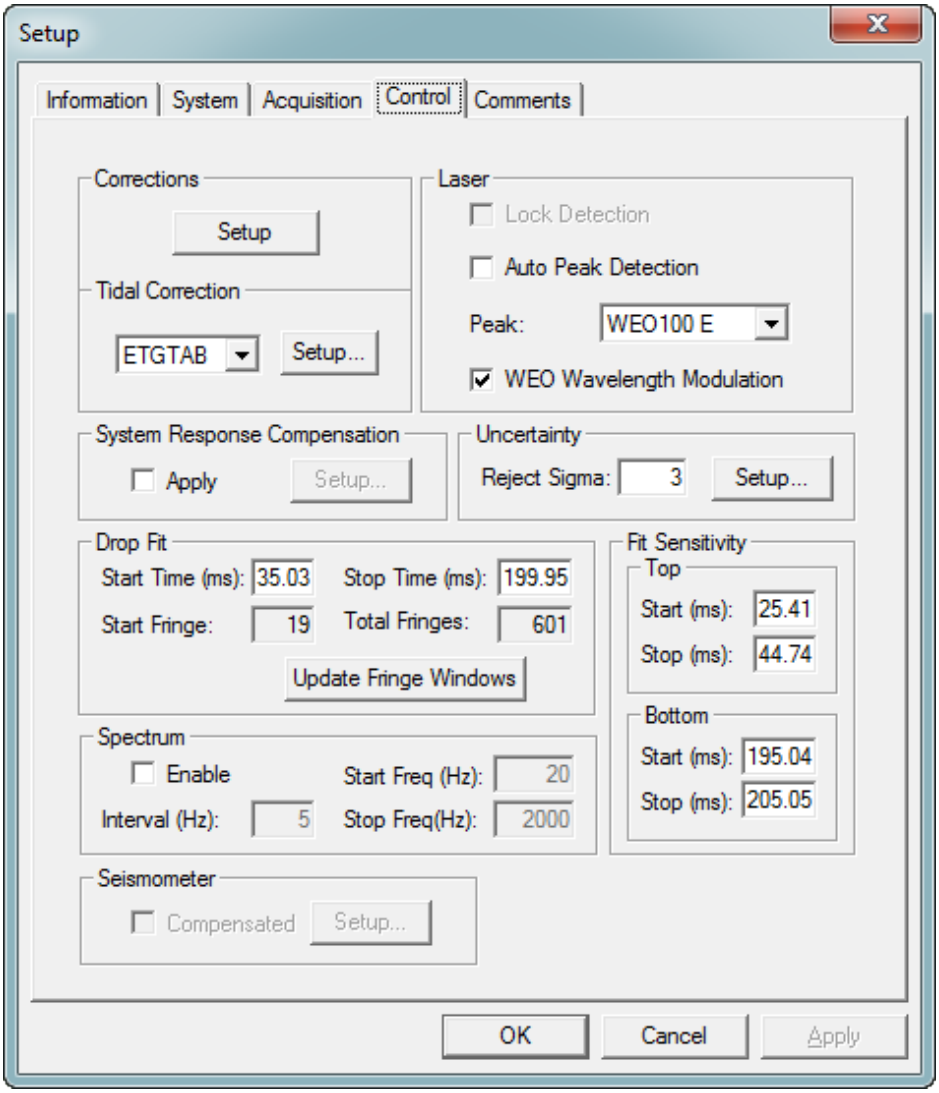


Figure 3-10 Setup Dialog: Control Tab Page

Corrections Section

Click the **Setup** button in the **Corrections** section to display the **Corrections Setup** dialog. The **Correction Setup** dialog is shown in Figure 3-11 and the options are described in Table 3-5. The options selected are applied when selected.

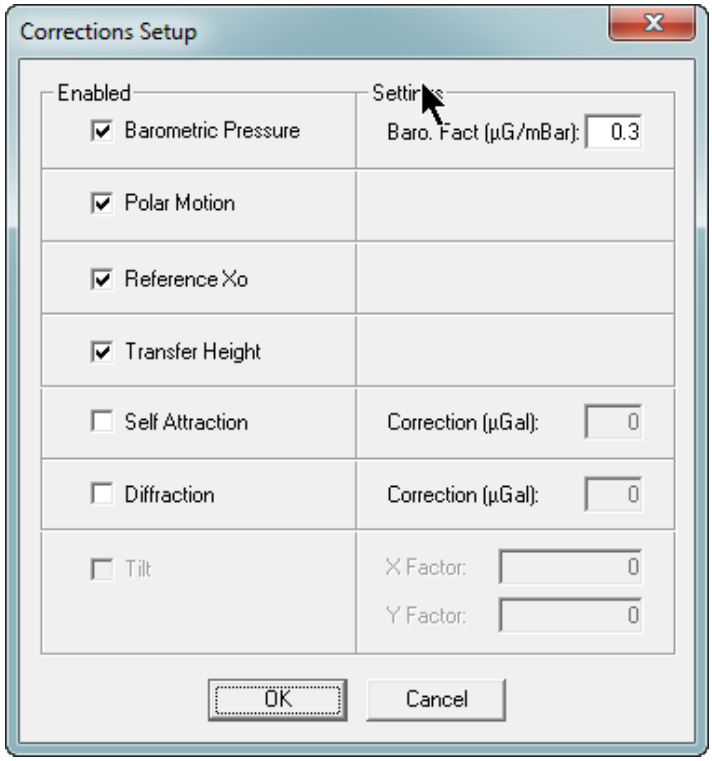


Figure 3-11 Control Tab: Corrections Setup Dialog

Table 3-6 Corrections Section: Setup Dialog Options Description

Corrections Setup Dialog	
Barometric Pressure	Enabling **Barometric Pressure** applies barometric pressure correction. The observed gravity is normalized to a nominal pressure at each site by applying a correction based on the observed atmospheric pressure during the observations. The **Barometric Pressure** correction is applied at each drop. The formula used to compute the pressure correction is: C(p) = A* (P(o) – P(n)) Where: A = The barometric admittance factor (µGal/mBar. This value is usually between 0.30 and 0.42. The recommended value (per IAG, 1983) is 0.30. C(p) = Barometric Pressure Correction in µGal. P(o) = Observed barometric pressure. P(n) = Nominal barometric pressure in accordance with DIN Standard #5450.
Polar Motion	Enabling Polar Motion correction applies polar motion correction. This correction compensates for changes in centrifugal acceleration due to variation of the distance of the earth's rotation axis from the gravity station. This correction

Corrections Setup Dialog	
	is normally re-computed using pole positions that are determined nearest to the observation time for each station. The formula specified in the IAGBN: Absolute Observations Data Processing Standards (1992) is used. The formula reads: $$\delta g = -1.164x10^{8}\omega^{2}a2\sin\varphi\cos\varphi(x\cos\lambda - y\sin\lambda)$$ Where: δg = polar motion correction in µGals, ω = earth's angular rotational velocity (rad/s), a = semi-major axis of the reference ellipsoid (m), φ = geodetic latitude (rad), λ = geodetic longitude (rad), X, y = polar coordinates in the IERS system (rad). Mean pole positions are determined at daily intervals and issued daily by the IERS Bulletin. The Bulletin A containing the polar motion coordinates in final and predicted format is available at no cost on the web. http://www.usno.navy.mil/USNO/earth-orientation/eo-products/weekly/bulla/bulletin-a/?searchterm=Bulletin%20A The Micro-g LaCoste website also posts the current polar motion values and information. http://www.microglacoste.com,
Reference X_0	Enabling Reference X0 applies reference X0 correction. In the equation of motion2 as used in g, gravity is determined at t_0 not at x_0. In order to calculate the gravity at the reference position, the distance to the start position, X_0, is multiplied by the site gravity gradient and used to correct the final calculated gravity value. The Reference Xo correction is generally very small (<0.05µGal).
Transfer Height	Enabling Transfer Height correction applies datum transfer correction. The gravity value is actually determined at the top of the drop. This height can vary from instrument to instrument, and is, in general, a not-so-useful location. However, the observed gravity for each drop is typically transferred to a user specified height (labeled "transfer") entered on the Information tab section of the Setup dialog. Typical gravity transfer heights are 0 cm, 100 cm, or 130 cm (often used for FG5s) above the ground. The transfer is calculated by adjusting the gravity value using the difference between the measured s height plus factory height and the transfer height, and multiplying the difference by the site gravity gradient.

Corrections Setup Dialog	
Transfer Height (continued)	**NOTE** In earlier version of the g-software (g8 Absolute Gravity Data Acquisition and Processing Software), this was known as the “Datum Height”.
Self Attraction	Enabling **Self Attraction** applies self attraction correction. This correction represents the perturbations of the gravitational field due to the mass distribution of the gravimeter itself. Typically this is a negative number.
Diffraction	Enabling **Diffraction** applies diffraction correction. This correction arises from the inherent curvature of the wavefronts in the laser beam. This error depends strongly on the diameter of the laser beam. This results in a systematic reduction in the measured gravity value. Therefore, the correction is a positive number.
Tilt	Enabling **Tilt** applies tilt correction. Because changes in verticality affect the gravity measurement, an internal tilt correction is applied. This correction is measured by using the tilt of the instrument on x and y axes.

Tidal Correction Section

Refer to the Section 6 “Tidal Correction Models” for a detailed discussion of the earth tide and ocean loading corrections.

NOTE In general, it is necessary to run the Ocean Load program once for each new location occupied by the gravity meter.

Laser Section

The options displayed in the **Laser** section are dependent upon the instrument model and laser type selected in the **System** tab.

The **Laser** section options are described in Table 3-6.

Table 3-7 Setup Control Tab: Laser Section

Laser Section Options	
WEO 100 Laser	**Lock Detection** By checking the **Lock Detection** check box and connecting the **Laser Lock** signal from the back of the WEO 100 controller (or the WEO 200) to CH 7 of the SIM (or older Patch Panel units), the g-software ignores drops that occur while the laser is unlocked. The g-software immediately ties another drop until the laser is locked. The g-software processes drops it until it “catches up” with the desired drop interval. **Auto Peak Detection** Checking the **Auto Peak Detection** check box determines the locked peak by checking the input voltage on the Patch Panel Laser input channel. The g-software uses the measured voltage on Channel 3 to determine which peak (DEFG or HIJ) was valid during the drop. If for some reason the voltage in Channel 3 is invalid, the user can still deselect **Auto Peak Detection** and manually enter the wavelength from the pull-down menu. **WEO Wavelength Modulation** Modulation Frequency includes the modulation frequency entered in the **System Laser Setup** page. The **WEO Wavelength Modulation** should always be selected when using a WEO 100 laser.
WEO 200 Laser	**Lock Detection** By selecting **Lock Detection** and connecting the **Laser Lock** signal from the back of the WEO 100 controller (or the WEO 200) to CH 7 of the SIM (or older Patch Panel units), g-software ignores drops that occur while the laser is unlocked. The g-software tries another drop immediately until the laser is locked. The g-software processes drops until it “catches up” with the desired drop interval.
ML1 Laser	When Instrument Type Model is **A10** and Laser Type Laser type **L Series** are selected in the **System** tab page, the Laser section options available are **Alternate Red/Blue** and **Peak**. For ML-1 or AL-1 lasers, the user can select the Red or Blue Wavelength, or select Alternate Mode. **L Red** Red wavelength-locked sets are displayed in Red on the Sets view. **L Blue** Blue-wavelength locked sets aredisplayed in Blue on the Sets view

	Alternate Red/Blue In **Alternate Red/Blue** mode, the software sends an impulse signal through the digital output of the patch panel and switches between the two modes between each set. **NOTE** In normal situations it is highly recommended to use **Alternate Red/Blue** mode. The g-software automatically takes an average of the red sets, an average of the blue sets, and then the resultant average of these values. It is the average of the blue and red wavelengths that is stable over long time periods (many months).

System Response Compensation Section

System Response is an advanced fitting routine that fits multiple numbers of damped sinusoids to the standard equation of motion. When System Response Compensation is enabled, it is possible to view the Power Spectral Density of the Residual Signal.

NOTE In most applications, it is not necessary to use System Response Compensation. It is designed for field applications in which the measurement surface is hollow, or otherwise unstable.

In a laboratory, or stable, pier-type situation, it is not necessary to use System Response Compensation.

It is recommended to only use System Response in post processing mode, because it can mask a problem with the site (by flattening out a residual signal that would otherwise indicate a problem).

To Apply System Response Compensation

To apply System Response Compensation, check the **Apply** box and press the **Setup** button on the **Control** tab page of the **Setup** dialog. The **Frequency Response Setup** dialog shown in Figure 3-12 appears. It is recommended to accept the default values:

- Max Number of Terms: 3
- Significance Threshold: .07
- Minimum Frequency (Hz): 15 Hz

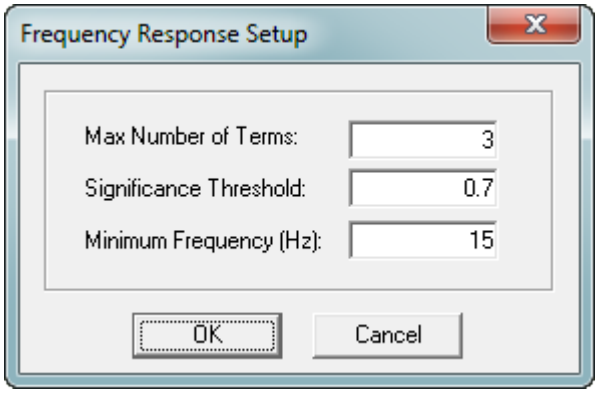


Figure 3-12 Frequency Response Setup Dialog

Uncertainty Section

Drop rejection significance determines which drops are automatically rejected by the g-software. The default value is three which means that in a set, any drop that is more than 3σ from the mean is rejected.

NOTE This function is purely statistical, there is no hardware information used to reject drops.

Uncertainties Dialog

Click the **Setup** button under the **Uncertainty** section of the **Control** tab to display the **Uncertainties** dialog shown in Figure 3-13.

The statistical uncertainty estimate is based on the estimated uncertainties from many different components of the measurement. Components are grouped into four separate areas:

- Modeling Uncertainties
- System Uncertainties
- Environmental Uncertainties
- Set-up Uncertainties

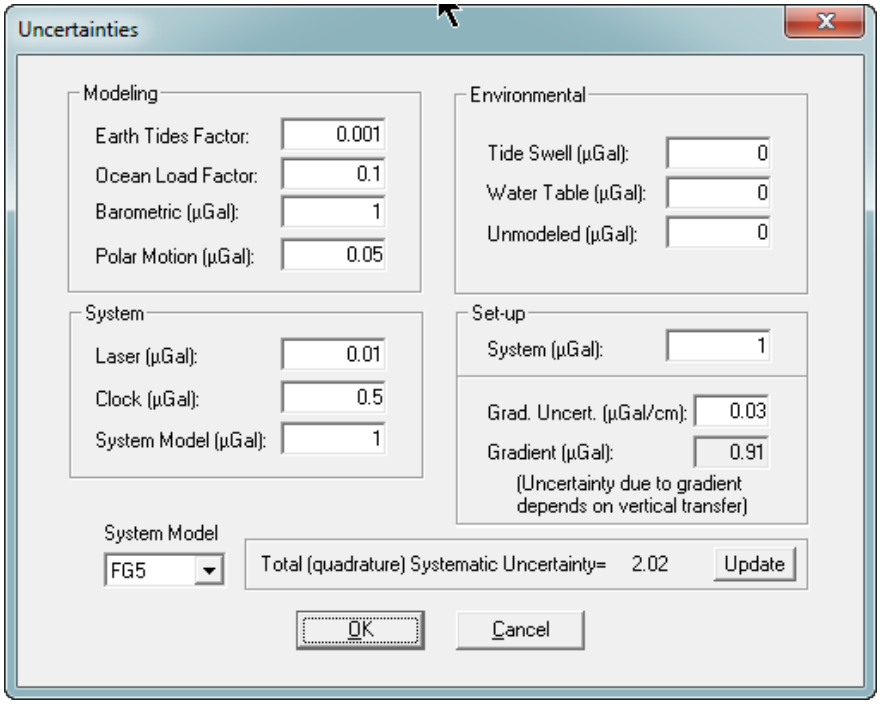


Figure 3-13 Setup: Control Tab Uncertainties Dialog

The default values are determined from previous publications and from in-house experience. Refer to the Uncertainties Setup Dialog Components Description section below for details.

On the lower left hand corner of the **Uncertainties** dialog (refer to Figure 3-13) is a **System Mode**l drop-down list and an **Update** button in the right hand corner. To use the default values for a specified instrument choose the appropriate instrument in the drop down list and press the **Update** button.

g-software now calculates the total uncertainty for each set and for the final project gravity value. The total uncertainty is given by:

$$\delta_{tot} = \sqrt{\delta_{sys}^2 + \delta_{stat}^2}$$

where δ_{stat} is the statistical uncertainty given by the set scatter (standard deviation) divided by the square root of the number of sets:

$$\delta_{stat} = \sigma_{set} / \sqrt{N_{set}} \ ,$$

and δ_{sys} is the total systematic uncertainty, which is described below

Uncertainties Dialog Options Description

Modeling Section

Modeling uncertainties usually do not vary from station to station or among different instrument serial numbers or models. The default values are guidelines only. For details, including position and seasonal variation see Niebauer *et al.,* "A New Generation of Absolute Gravimeters, Metrologia, 1995".

Recommended values for modeling uncertainties are seen in table Table 3-6.

Table 3-8 Recommended Values For Modeling Uncertainties

Barometric	1.0 µGal
Polar Motion	0.05 µGal

The errors for the earth tide and ocean load calculations are estimated as fractions of the size of the actual correction (determined at the time of the measurement) and nominal values are listed in Table 3-7.

Table 3-9 Nominal Earth Tide And Ocean Load Uncertainties

Earth Tide Factor	0.001 x Correction
Ocean Load Factor	0.1 x Correction

Examples:

If at a given time the earth tide correction is 50µGal, then the uncertainty on the correction is 0.05 µGal.

System Section

System uncertainties vary depending on what elements are contained in the absolute gravimeter system. FG5 are the most accurate and precise MGL instruments, and observations taken from these types of instruments should be weighted much more than those taken from an FGL. Refer to Table 3-8 for recommended values.

Table 3-10 Recommended Values For Modeling Uncertainties

Laser	0.05 µGal (WEO) 0.1 µGal (ML-1)
Clock	0.5 µGal (Rubidium Oscillator)
System Model	µGal (FG5) 10 µGal(A10) 5 µGal(A5) 10 µGal(FGL)

Environmental Section

Environmental errors are highly site dependent and should be modified by only experienced users. Recommended values for all environmental uncertainties are 0.0µGal (zero) unless a user is very knowledgeable about the site in question.

Setup Section

System (µGal) uncertainties are dependent on both the instrument and the operator.

Example:

Set-up errors change according to the instrument and may be increased with respect to the operator.

- An experienced operator can set up an FG5 with a system error of 1.0 µGal.
- An experienced relative meter operator can measure a gradient to 0.03 µGal/cm.

Grad Uncert. is set to 0.03µGal/cm (For experienced relative meter operators).

Drop Fit Section

The **Drop Fit** section sets parameters which allow a subset of the collected fringes to be processed (to avoid fitting during the sensitive release and catch phases of the drop). Default parameters for an FG5 (A10/FGL) are:

- Start Time = 35 (20) ms
- Stop Time = 200 (135) ms
- Start Fringe
- Total Fringes

Fit Sensitivity Section

The calculated gravity value is determined using the fringes selected in the **Drop Fit** section. Ideally, this value is not heavily dependent on the choice of these fringe values. The **Fit Sensitivity** plots in the **View** menu allow the user to determine the change in the calculated gravity value as different portions of the drop fit are processed. By default, a few milliseconds around the start time and stop time are plotted. Typically the gravity value should be constant within a few μGals. Given the nominal fit times above, the sensitivity settings for an FG5 (A10/FGL) should be approximately:

- Top Start -25 (15) ms
- Top Stop -45 (25) ms
- Bottom Start -195 (130) ms
- Bottom Stop -205 (140) ms

Spectrum Section

To enable this feature, check **Enable** and enter the **Interval (Hz)** and **Start Freq (Hz)** and **Stop Freq (Hz).**

The graph can then be accessed in the **View** menu of the main g-software window. The graph shows the current drop spectrum in green and the average set spectrum in blue. Refer to Figure 3-14.

NOTE	The System Response must be enabled to view the spectrum.

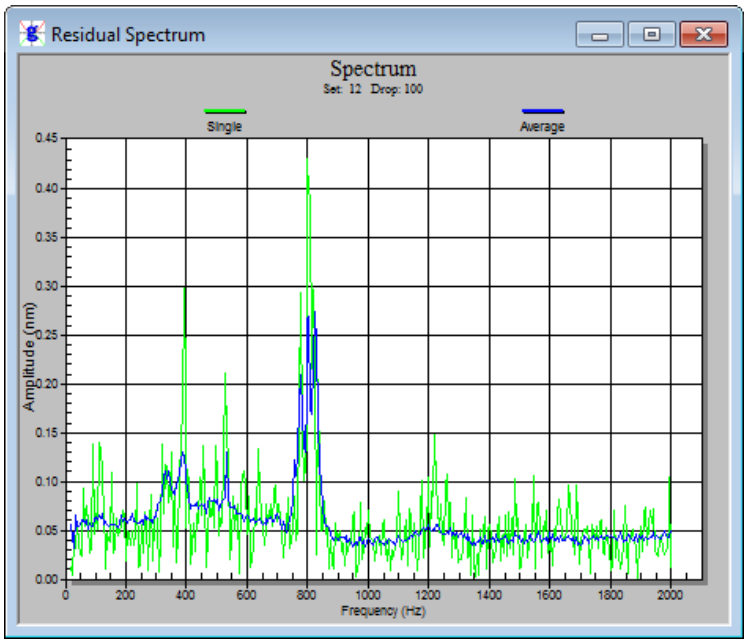


Figure 3-14 Drop Residual Spectrum Graph

Seismometer Section

Checking **Compensated** in the **Seismometer** section enables the compensation of the seismometer data when used on the FGL Prototype instruments.

Comments Tab

Users may enter up to 100 lines of field or processing notes in this section. To enter a new line, press **CTRL** + **ENTER**. Refer to Figure 3-15.

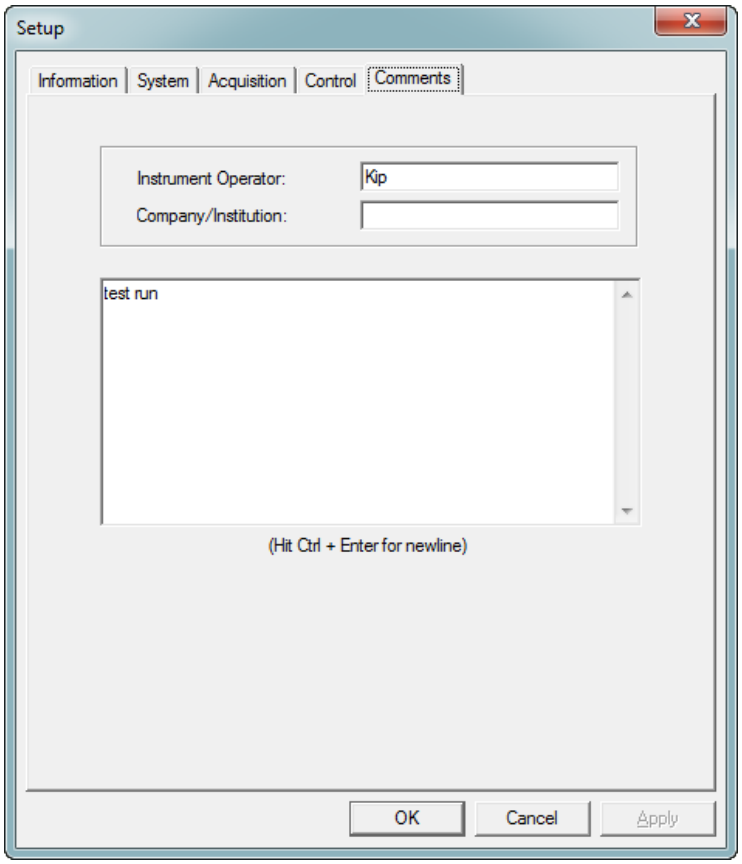


Figure 3-15 Setup: Comment Tab

4. BEGINNING ACQUISITION OR REPROCESSING

Start Processing 4-1
State Dialog 4-2
Drop Gravity Dialog 4-5
Set Gravity Dialog 4-5
Residuals Dialog 4-6

Start Processing

Once g-software is setup according to user-set parameters, it is ready to begin processing the data. There are three ways to start processing:

1. Select **Go** from the **Process** menu.
2. Press the "Go" button (►).
3. Press **F5**.

In real time mode, the drops occur as configured in the **Acquisition** tab page in the **Setup** dialog. In Post-Processing mode, the drops are processed as configured in **Rate** dialog accessed from the **Process** menu.

NOTE If a minor problem is detected in the setup as acquisition begins, simply click the "Pause" button, fix the problem detected, and then resume processing by clicking the "Go" button.

As the project progresses, the Set data filenames are displayed in the **Project** navigation panel (located on the left side of the g-software main window). In the example shown in Figure 4-1, each set is named sequentially, (001 through XXX, where XXX is the total number of sets collected) with the project name used as the prefix and .”gsf” as the suffix.

By default, g-software opens four dialogs of the data at start-up. Each dialog can be enabled by clicking the tab control at the bottom of the g-software window.

The four default dialogs are:

- State
- Drop Gravity
- Set Gravity
- Residuals

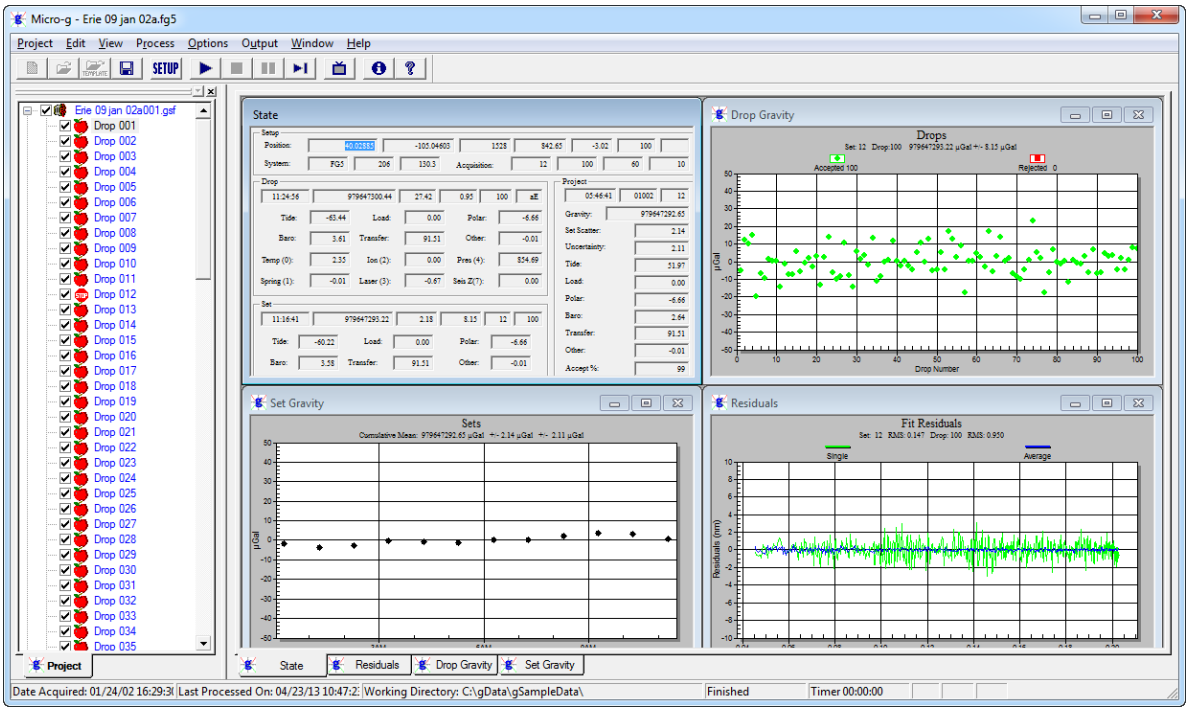


Figure 4-1 g-software Main Window Showing Open Project File

State Dialog

The **State** dialog is the main dialog that g-software uses to convey information to the user. The **State** dialog contains four separate sections: **Setup**, **Drop**, **Project**, and **Set**. Each section is described below. The meaning of each box value is displayed by “hovering” the mouse cursor over the box until the “tool tip” appears. Refer to Figure 4-2

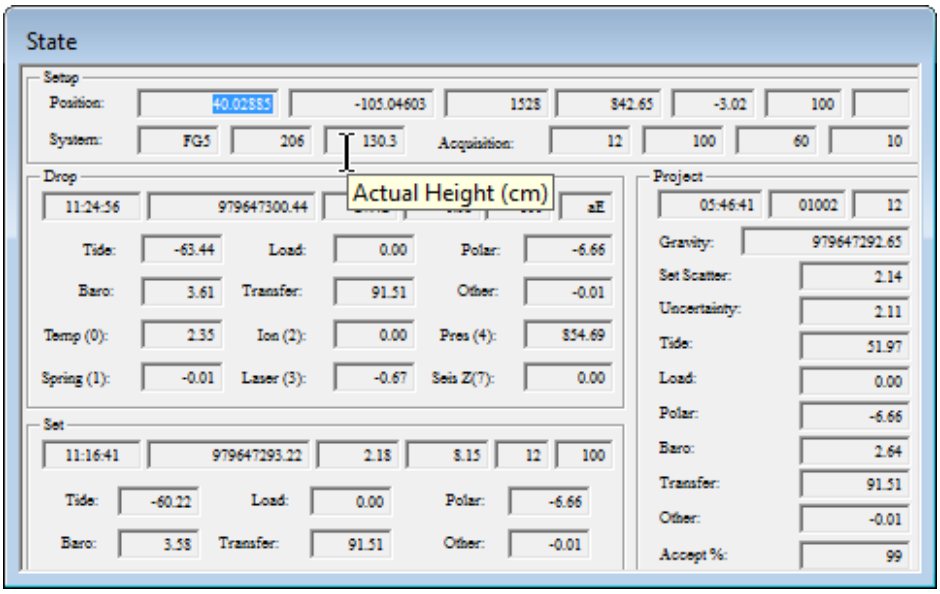


Figure 4-2 State Dialog Example Tool Tip: Actual Height (cm)

Setup Section

The Setup section displays basic setup and station information.

Position

- Latitude
- Longitude
- Elevation (m)
- Standard Pressure (mBar)
- Gradient (µGal/cm)
- Transfer Height (cm)

System

- Meter Type
- Meter Number (Serial Number)
- Actual Height (cm)

Acquisition

The Acquistion section indicates the drop rate parameters.

- Number of sets to be acquired
- Number of drops per set
- Set Interval (min): Time interval in minutes between sets
- Drop Interval (sec): Time interval in seconds between drops

Drop Section

The **Drop** section displays information about each individual drop:

- Drop Time
- Drop Gravity Absolute Gravity Value (µGal):
- Drop Sigma: Standard deviation
- Drop RMS (Root Mean Square Residual size) (nm)
- Drop Number
- Drop Acceptance/LASER PEAK
  - Accepted (a) or Rejected (r)
  - Laser Lock peak (e-h for WEO laser, r-b for L series)
- Tide: Tide correction (µGal)
- Load: Ocean loading correction (µGal)
- Polar: Polar Motion correction (µGal)
- Baro: Barometer correction) (µGal)
- Transfer: Transfer height correction (µGal)
- Other: Ref Xo Reference Xo correction (µGal)
- Temp (0):Temp (Channel: 0) (Temperature °C)
- Ion (2): Channel 2 Ion pump monitor (V)
- Pres (4): (Channel: 4) barometric pressure (mBar)
- Spring (1): (Channel: 1) Super spring position (V)
- Laser (3): (Channel: 3) Laser output (V)
- Seis Z (7): (Channel: 7) Average seismometer reading (V).

Set Section

A group of drops is referred to as a “set”. The Set section displays information about each individual set.

- Set Time Mean: time of the accepted drops in the set
- Mean Set Gravity: Mean absolute gravity for current set (µGal):
- Set Total Uncertainty: Total uncertainty (µGal)
- Set Drop Scatter: Drop to drop scatter for current set (µGal)
- Set Number: Number of the current set in Project
- Percentage of accepted drops

- Tide: Mean tide correction(µGal)
- Load: Mean ocean loading correction(µGal)
- Polar: Mean polar motion correction(µGal)
- Baro: Mean barometric correction(mbar)

- Transfer: Mean datum transfer correction(µGal)
- Other: Mean reference Xo correction. (µGal)

Project Section

The group of all the sets constitutes a “project”. Summary information about the project is displayed:

- Project Mean Time of sets processed
- D.O.Y (dddyy) Day of year
- # of Sets completed
- Gravity: Total average gravity value over all sets (µGal)
- Set Scatter: Set to set standard deviation (µGal)
- Uncertainty: Total uncertainty in (µGal)
- Tide: Mean tide correction for project (µGal)
- Load: Mean ocean loading correction for project (µGal)
- Polar: Mean polar motion correction (µGal)
- Baro: Mean barometric correction(µGal)
- Transfer: Mean datum transfer value (µGal)
- Other: Mean reference Xo correction (µGal)
- Accept %: Total fraction of drops not rejected

Drop Gravity Dialog

The Drop Gravity dialog displays individual drops minus the mean value of the set. Accepted drops, i.e. those that are within the user-selected statistical range, are plotted in green and the rejected drops are plotted in red. The current set number, the current drop number, the current drop-to-drop scatter of the set, as well as the number of drops accepted and the number of drops rejected are listed above the graphics.

Set Gravity Dialog

The Set Gravity dialog displays individual set gravity values minus the mean value of the project.

Each set is plotted with an error bar that indicates the range of the uncertainty for the individual set (based on the drop scatter). The current cumulative mean for the project, the set to set scatter, and the total uncertainty of the project mean are displayed above the graphics.

For g-software Versions 6 and later, the current set value is updated with each drop. This is true after the first set is

complete. This allows quick verification that the mean value is consistent with earlier sets.

Refer to Figure 4-3 for an example current set value update. The first five sets are complete (120 drops each) and the 6th set is only on drop #3. The mean value of the 6th set will approach the established mean, and the error bars will decrease as more drops are acquired.

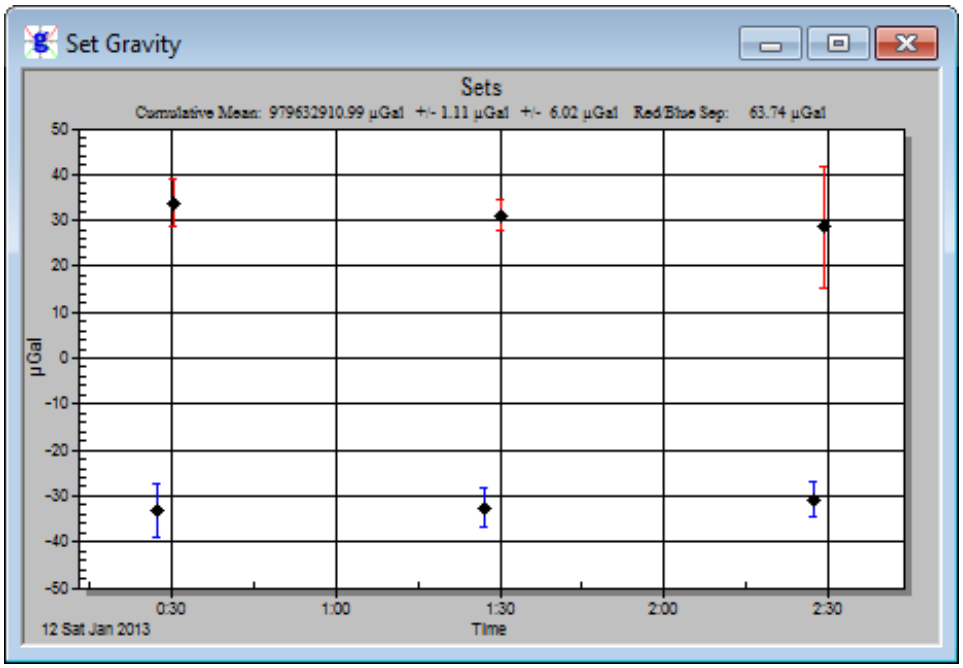


Figure 4-3 A10 Example Data: Current Set Value Update (A10 example data)

Residuals Dialog

The Residuals dialog displays the Fit Residuals signal (the difference between the actual fringe time and the least squares fit estimate of the position at that time).

Drop Residuals with System Response Disabled

Figure 4-4 shows a Drop Residuals example with the system response disabled. The green signal is the residual vector from the current drop, while the blue signal represents the average residual of the accepted drops so far. If the instrument is working properly, the blue signal should always be smaller in

amplitude than the green signal. If a drop is rejected, its residual signal is plotted in red.

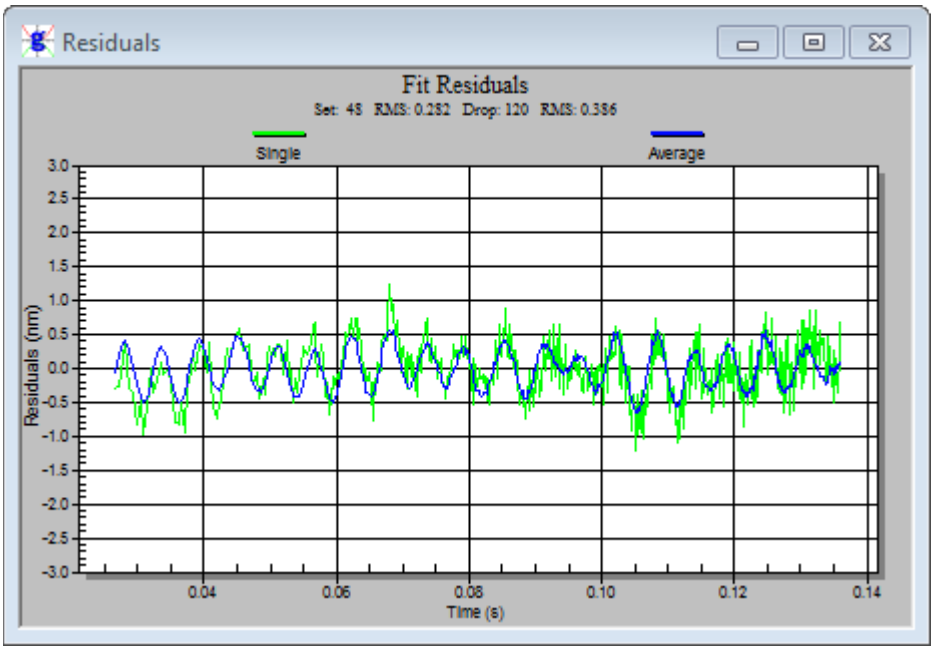


Figure 4-4 Drop Residuals: System Response Disabled

Figure 4-5 shows an example of a Drop Residuals with the system response enabled. The orange signal is the compensated residual vector from the current drop, the green signal is the uncompensated residual vector from the current drop, and the purple signal represents the compensated average residual of the accepted drops.

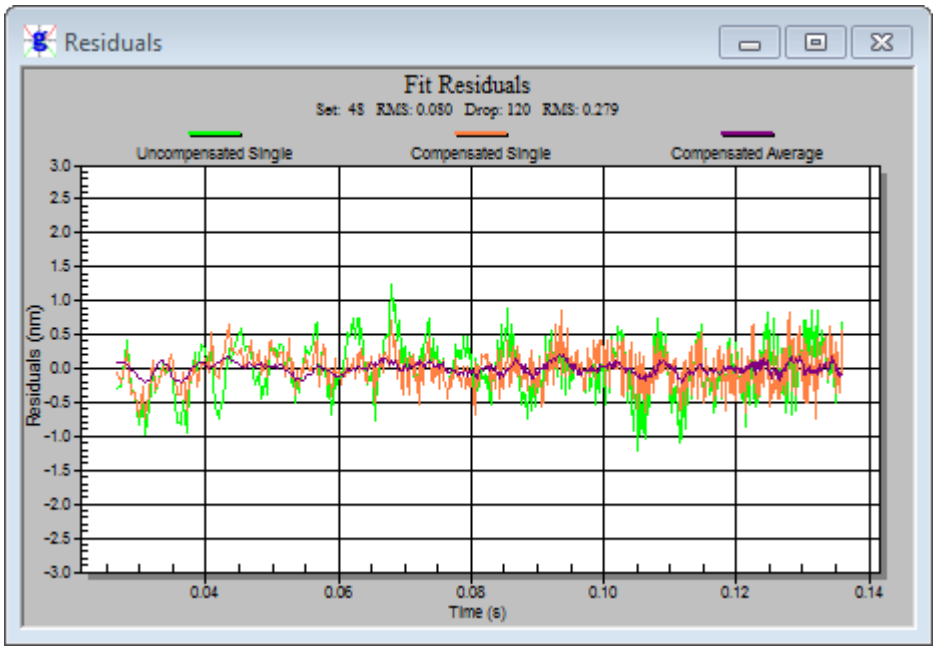


Figure 4-5 Drop Residuals: System Response Enabled

5. ADDITIONAL DIALOGS

Specific Post Processing Features 5-3
Project Navigation Panel 5-3
Reviewing Processing Parameters 5-4
Output File Status 5-5
Processing Status 5-6
Processing Finished 5-10
Reviewing Processing Results 5-11
Project Summary File 5-11
Set Summary file 5-13

In addition to the default dialogs: **State**, **Drop Gravity**, **Set Gravity** and **Residuals**, g-software also provides a variety of dialogs to convey information about the processing (or data acquisition) status. Table 5-1 provides description of each g-software dialogs accessible from the **View** menu.

Table 5-1 g-software Dialogs And Description

Dialogs	Description
Set Gravity	Displays individual set gravity values minus the mean value of the project.
Set Histogram	Displays a histogram of the processed sets. In general, users should expect to see normally distributed data.
Set Sensors	Displays five separate charts. These charts show the default channels for a Micro-g LaCoste Patch Panel: Temperature, Super Spring, Ion Pump, Laser and Barometer.
Set User Sensors	Displays up to six separate charts if enables. These charts show the user channels 5-10. Not all of these channels are available with every system.
Set Corrections	Displays six separate charts, one for each type of correction applied to the calculated gravity value: Tide, Ocean Loading, Polar Motion, Barometric, Datum Transfer and Reference Xo. Units are in µGals (with the exception of the barometer in mbar).
Set Horizontal Pos	For future use.
Set Vertical Pos	For future use.
Set Fit Sensitivity	Displays the standard deviation of the fit sensitivities for each set.
Drop Gravity	Displays individual drops relative to the mean value of the set.
Drop Histogram	Displays a histogram of the processed drops for the currently processed set. In general, users should expect to see normally distributed data.
Drop Sensors	Displays up to five charts for the currently processed set. These charts show the default channels for a Micro-g LaCoste Patch Panel: Temperature, Super Spring, Ion Pump, Laser and Barometer.

Dialogs	Description
Drop User Sensors	Displays up to six separate charts if enables. These charts show the user channels 5-10. Not all of these channels are available with every system.
Drop Corrections	Displays six separate charts, one for each type of correction applied to the calculated gravity value for the current set: Tide, Ocean Loading, Polar Motion, Barometric, Datum Transfer and Reference Xo. Units are in µGals (except for the barometer which is in mbar).
Drop Parabola	Displays the trajectory of the object with time on the X axis and distance on the Y axis. This graph is useful to view dropping chamber and fringe data acquisition performance.
Drop Seismometer	This view is applicable for "LS" meters only and has two components. If seismometer data is used directly in the solution, the graph shows the compensated versus uncompensated residuals (nm). If the seismometer data is not used in the solution, the graph shows the seismometer velocity (mV).
Drop Residual PSD	This view shows an auto scaled Power Spectrum Density (PSD) of the residual signal. **NOTE**: Frequency Response must be enabled.
Drop Fit Sensitivity (Top and Bottom)	Displays the change in the calculated gravity value as different portions of the drop fit are selected. Values are displayed relative to the value determined at the nominal fit selected from the Control tab page in the Setup dialog.
Drop Residuals Spectrum	Displays the drop and average set residual spectrum. This must be enabled in the Control tab page in the Setup dialog.

NOTE Viewing many displays can significantly slow down data processing and this can in turn result in potential memory violations. If your system does not have a high end graphics card (>32mb on-board memory), minimize the number of open views.

Specific Post Processing Features

Project Navigation Panel

g-software automatically displays the **Project** navigation panel at start-up when opening an existing project (where data has already been acquired). The Project navigation panel is located on the left side of the g-software main window. The Project navigation panel is used to select which sets are to be processed and to set a break point in the processing if necessary.

Figure 5-1 shows a detailed view of the Project navigation panel. The check boxes to the left of the Set Filename indicate whether or not the set is included in the processing. Sets may be checked or unchecked by placing the mouse cursor directly over the box and clicking the left mouse button.

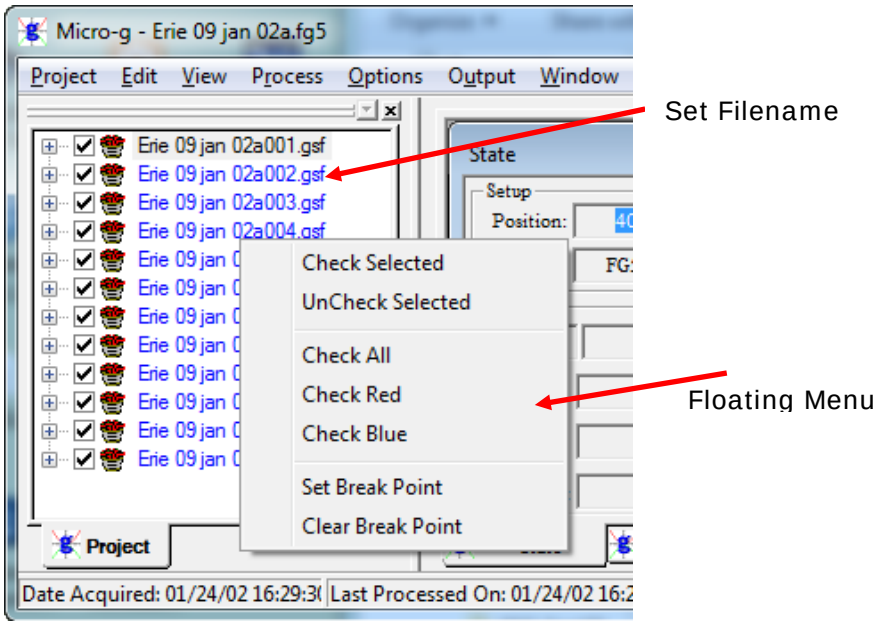


Figure 5-1 Example Project Navigation Panel: Control Dialog

Optionally, single click the left mouse to highlight a set. To highlight multiple sets, highlight one set then use the <SHIFT> key and <↑> or <↓> arrow keys accordingly.

The right mouse button brings up the floating menu (Refer to Figure 5-1). Table 5-2 describes the available menu options.

Table 5-2 Project Navigation Panel: Control Dialog Menu Options

Menu Option	Description
Check Selected	Checks all highlighted sets.
UnCheck Selected	Unchecks all highlighted sets.
Check All	Checks all sets.
Check Red	Checks all odd numbered sets (for use in ML-1 Red/Blue Lock Analysis)
Check Blue	Checks all even numbered sets (for use in ML-1 Red/Blue Lock Analysis)
Set Break Point	Places a “Break Point” marker by the selected set. g-software processes up to the break point and then pauses.
Clear Break Point	Clears the breakpoint.

When reprocessing data for the first time after collecting data and reopening a project, it is best to process all sets in the project, then go back and delete unwanted sets.

Click **Quick Update** under the **Process** menu to quickly recalculate the mean project gravity value and update the set views if no parameters are changed. If any processing parameters are changed, g-software automatically recalculates gravity for the entire data set.

Reviewing Processing Parameters

Processing parameters may be reviewed and/or modified in the **Setup** dialog. From the **Process** menu select **Setup**. It can also be accessed by pressing the **F3** key. Listed below are the Setup parameters that may be altered before reprocessing old data.

Information Tab

The instrument location parameters are entered on the Information tab page. The user can enter: Site Name, Site Code, Latitude, Longitude, Elevation, Nominal Pressure, Gravity Gradient, Transfer Height, Measured Setup Height, Barometric Factor, Polar motion values. Refer to Section 03 "Information Tab" for additional information.

System Tab

Parameters for the system are entered on the System tab page. Refer to Section 03 "System Tab" for additional information.

Information about Instrument Type, Model Serial Number, Interferometer Type, Laser Type (and wavelengths if applicable), Seismometer data collection enabled (if applicable, FGL Series instruments only), Analog to Digital data acquisition card and setup, Serial Barometer setup can be entered. The Advanced parameters may also be changed.

Acquisition Tab

The Acquisition parameters may not be changed in post-processing. Refer to Section 03 "Acquisition Tab" for example screen shot and additional information.

Control Tab

All control parameters may be changed with the exception of the laser lock (WEO) or alternate (ML1) functions. See Section 03 "Control Tab" for example screen shot and additional information.

Comments Tab

The Comments tab page is used to record the measurement specific operator, organization and comments. Users may enter up to 100 lines of field or processing notes in this section. To enter a new line, press **CTRL** + **ENTER**.

Output File Status

After starting to reprocess data, g-software asks the user if the current existing Project Summary and Set by Set Summary files should be overwritten. g-software creates these two output ASCII text files by default. Refer to Section 05 “Reviewing Processing Results” for additional information and to Figure 5-4 and Figure 5-5 for an example output files.

- Project Summary File
  - By default, the files are named <project name>.project.txt
  - Figure 5-4 displays an example file.
- Set by Set Summary File
  - By default, the files are named <project name>.set.txt.
  - Figure 5-5 displays an example file.

To change the names of the output files to preserve prior processing results:

- Enter **NO** when prompted to overwrite the current existing Project and Set summary files.
  - Enter YES and the existing files are overwritten.
- Enter your default base name. For Example: "goutput1"
  - g-software creates two ACSII text files: goutput1.project.txt and goutput1.set.txt
- Press **OK** button to begin processing the data.
- When processing is complete, the computer beeps twice and the bottom message panel indicates "Finished".

NOTE The beeps do not sound from an installed sound card but only the computer's local speaker

- Use a Windows Explorer to navigate to the gSampleData folder.
  - The folder displays both goutput2.project.txt and goutput2.set.txt
  - These files are ACSII text and can be opened with any text editor.

Processing Status

Using the default dialogs **State, Drop Gravity, Set Gravity** and **Residuals**, the data processing status can be quickly evaluated. In the following examples, a break point is set at Set 3 to pause the processing. The screen shown in Figure 5-2 is captured immediately following the last processed drop of Set 2. The **Stop** icon in the Project navigation panel indicates the break point shown in Figure 5-2.

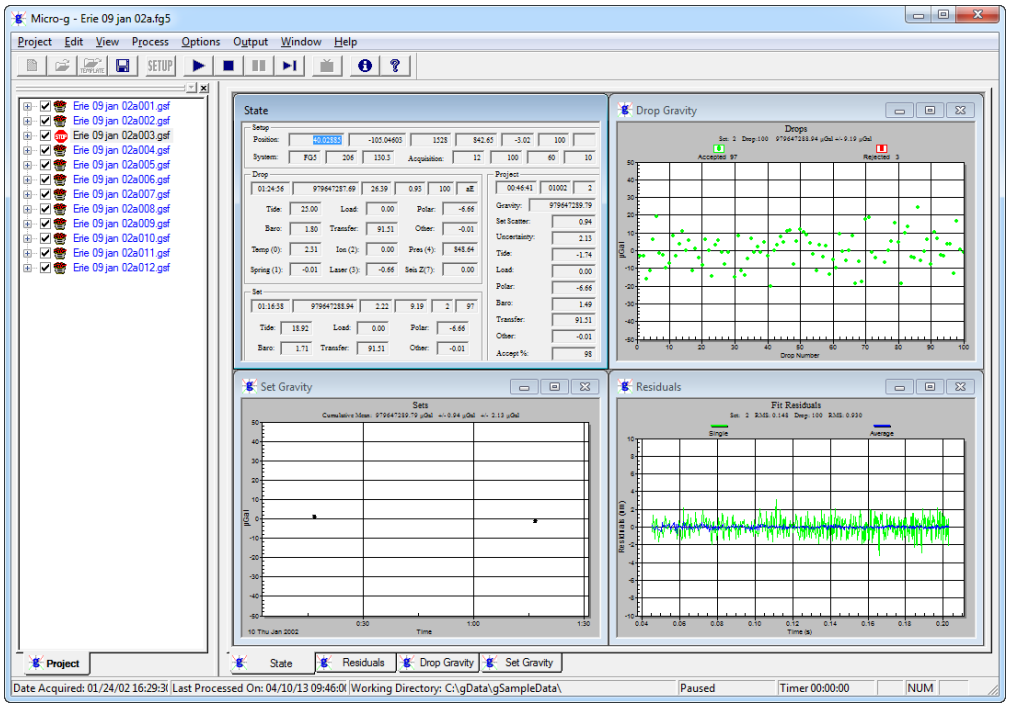


Figure 5-2 Processing Status After Completion of Set #2

The **Set Gravity** dialog in the lower left hand corner of the g-software main window shows the two previously processed sets and their Uncertainty error bars. The two sets are plotted with the mean subtracted. The mean value is displayed above the graph. Refer to Figure 5-2.

The **Residuals** dialog in the lower right hand corner of the g-software main window shows the average residual signal for Set 2 in blue and the single drop residual signal for Drop 100, Set 2 in green. Refer to Figure 5-2.

The **Drop Gravity** dialog in the upper right hand corner of the g-software main window shows all the gravity values for Set 2 with the mean subtracted. Refer to Figure 5-2.

The **State** dialog in the upper left hand corner of the g-software main window shows text information for Drop 100-Set 2, Set 2, and the cumulative average for the entire project. Refer to Figure 5-2 and Figure 5-3.

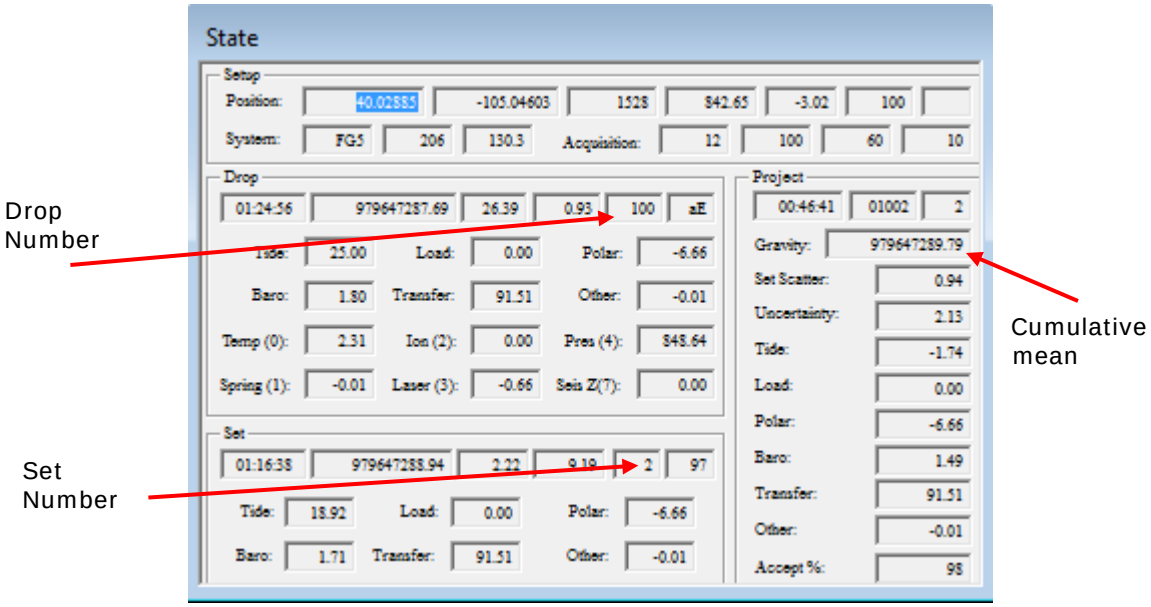


Figure 5-3 Example State Dialog

The **State** dialog is always displayed and contains the most information of any of the twelve views.

In Figure 5-3, basic project setup information is shown in the **Setup** section (First Section) of the **State** dialog.

- Position (40.02885, -105.04603, 1528)
- Nominal pressure (842.65)
- Gradient (-3.02)
- Instrument type and serial number, (FG5 206)
- Acquisition parameters (12 sets, 100 drop/set, 60 minute set intervals, 10 second drop intervals).

Many of the boxes are not labeled in order to maximize the information displayed and keep the view uncluttered. Hovering the mouse cursor over each box, displays a “tool tip” including units and a description of the value.

Information pertaining to the current drop being processed is displayed in the **Drop** section (Second Section) of the **State** dialog in Figure 5-3:

- Time of the drop (01:24:56)
- Corrected absolute gravity value of the last drop (979647287.69)

- Standard deviation of the drop (26.39)
- RMS of the drop fit (nm) (0.93)
- Drop number (100)
- Drop accepted or rejected and the peak lock
  - “aE” implies accepted, E lock.
  - "a" accepted, "r" rejected.

The next six boxes show the corrections in µGal for:

- Tide (25.00)
- Ocean loading (0.00)
- Polar motion (-6.66)
- Barometric (1.80)
- Datum transfer (91.51)
- Reference Xo (-0.01)

The final six boxes show the current value of the sensor channels for only the first six channels. All values are listed in Volts and correspond to the standard patch panel configuration on all Micro-g LaCoste instruments.

The **Set** section (Third Section) contains information pertaining to the current set being processed. In the case of Figure 5-3 it is Set two.

- Average time of the accepted drops used to calculate the set mean (01:16:38)
- Average corrected gravity value (979647288.94)
- Uncertainty of the set in µGal (2.22)
- Drop to drop scatter in µGal (9.19)
- Set number (2)
- Number of drops accepted (97)

The next six boxes display the average value of the corrections applied in µGal:

- Tide (18.92)
- Ocean loading (0.00)
- Polar motion (-6.66)
- Barometric (1.71)
- Datum Transfer (91.51)
- Reference Xo (-0.01).

The **Project** section (Right Side) contains information pertaining to the current state of the project through the last processed set. Refer to Figure 5-3.

- Average time of the sets (00:46:41)
- Day of the year and last two digits of the current year (01002)
  - The tenth day of the year 2002
- Last processed set (Set 2).
- Average corrected gravity (979647289.79)
- Set to set scatter (0.94 µGal)
- Set uncertainty (2.13 µGal)
- Average applied corrections for the current project in µGal.

Processing Finished

Two “beeps” sound from the computer’s speaker indicating processing is complete and the bottom message panel indicates “Finished”.

NOTE The beeps do not sound from an installed sound card but from the computer’s local speaker.

For the example the final gravity value is 979647292.67µGal with a set scatter of ±2.26 µGal and a total uncertainty of ±2.24µGal.

Reviewing Processing Results

Use Windows Explorer to navigate to the gSampleData folder. The summary output status files are located in this folder and are ASCII text that can be opened with any text editor. The example summary files (goutput1.project.txt and goutput1.set.txt) are found in this folder.

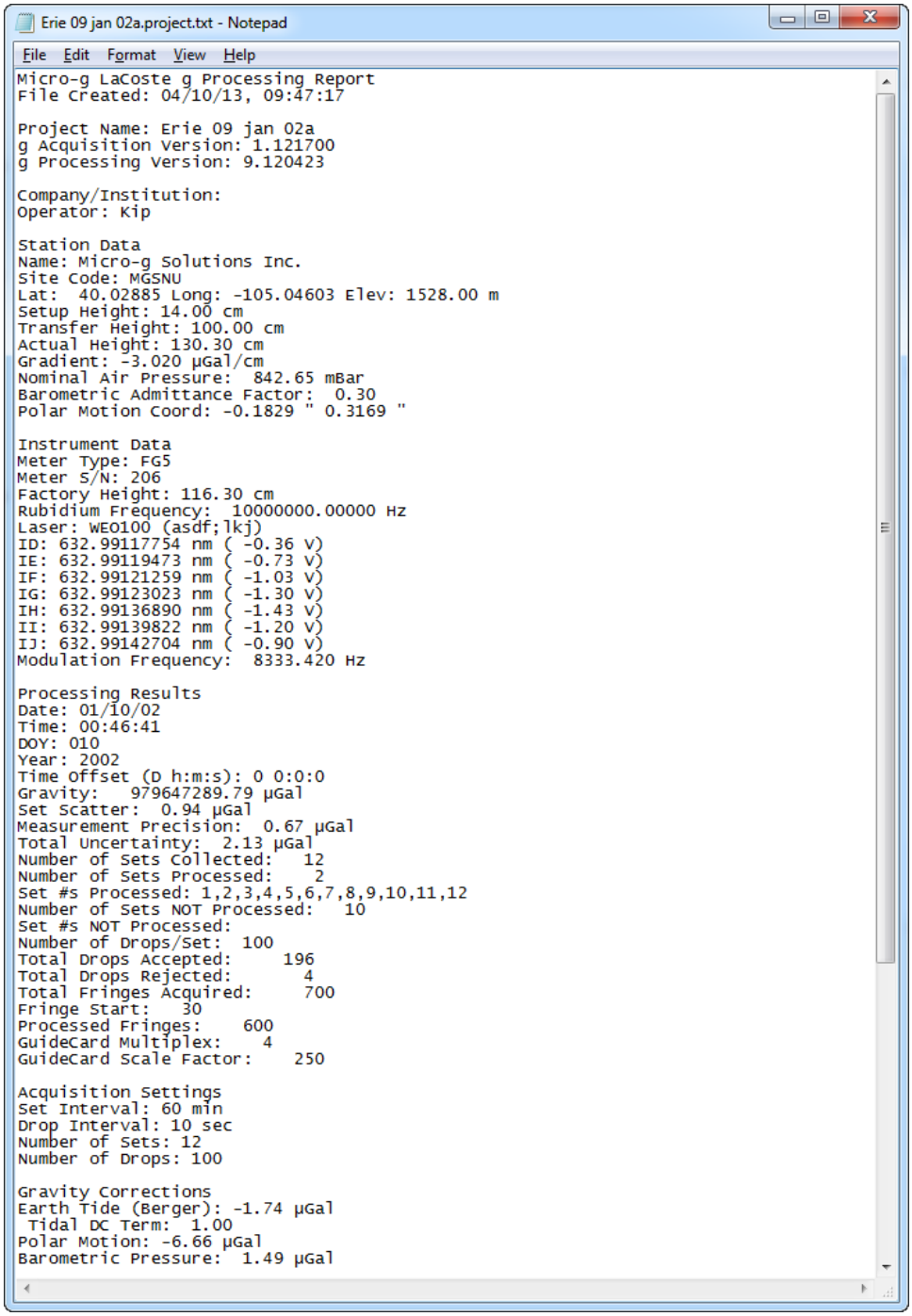
Project Summary File

The project summary file is designed to be a snapshot of the acquisition and data processing. It is intended to serve as the primary resource for archiving absolute gravity data. Figure 5-4 is an example of the project summary file.

The output data is divided into related sections:

- File creation and Header Information
- Station Information
- Instrument Data
- Processing Results
- Gravity Corrections
- Uncertainties
- Comments.

Depending on the options selected (Laser, Tide Model, Ocean Loading), sections may include additional information.



Erie 09 jan 02a.project.txt - Notepad

File Edit Format View Help

```
Micro-g LaCoste g Processing Report
File Created: 04/10/13, 09:47:17

Project Name: Erie 09 jan 02a
g Acquisition Version: 1.121700
g Processing Version: 9.120423

Company/Institution:
Operator: Kip

Station Data
Name: Micro-g Solutions Inc.
Site Code: MGSNU
Lat:  40.02885 Long: -105.04603 Elev: 1528.00 m
Setup Height: 14.00 cm
Transfer Height: 100.00 cm
Actual Height: 130.30 cm
Gradient: -3.020 µGal/cm
Nominal Air Pressure:  842.65 mBar
Barometric Admittance Factor:  0.30
Polar Motion Coord: -0.1829 " 0.3169 "

Instrument Data
Meter Type: FG5
Meter S/N: 206
Factory Height: 116.30 cm
Rubidium Frequency:  10000000.00000 Hz
Laser: WE0100 (asdf;lkj)
ID: 632.99117754 nm ( -0.36 V)
IE: 632.99119473 nm ( -0.73 V)
IF: 632.99121259 nm ( -1.03 V)
IG: 632.99123023 nm ( -1.30 V)
IH: 632.99136890 nm ( -1.43 V)
II: 632.99139822 nm ( -1.20 V)
IJ: 632.99142704 nm ( -0.90 V)
Modulation Frequency:  8333.420 Hz

Processing Results
Date: 01/10/02
Time: 00:46:41
DOY: 010
Year: 2002
Time Offset (D h:m:s): 0 0:0:0
Gravity:   979647289.79 µGal
Set Scatter:  0.94 µGal
Measurement Precision:  0.67 µGal
Total Uncertainty:  2.13 µGal
Number of Sets Collected:   12
Number of Sets Processed:    2
Set #s Processed: 1,2,3,4,5,6,7,8,9,10,11,12
Number of Sets NOT Processed:   10
Set #s NOT Processed:
Number of Drops/Set:  100
Total Drops Accepted:     196
Total Drops Rejected:       4
Total Fringes Acquired:     700
Fringe Start:   30
Processed Fringes:    600
GuideCard Multiplex:    4
GuideCard Scale Factor:    250

Acquisition Settings
Set Interval: 60 min
Drop Interval: 10 sec
Number of Sets: 12
Number of Drops: 100

Gravity Corrections
Earth Tide (Berger): -1.74 µGal
 Tidal DC Term:  1.00
Polar Motion: -6.66 µGal
Barometric Pressure:  1.49 µGal
```

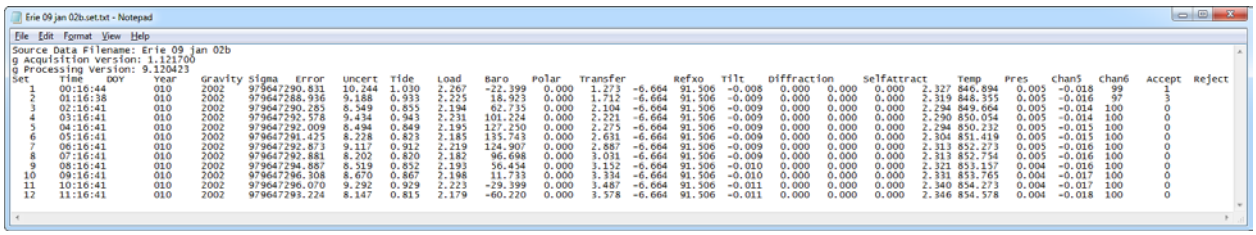
Figure 5-4 Example Project Summary File

Set Summary file

The set summary file contains set by set information. Figure 5-5 is an example set summary file. The file is tab delineated and is easily imported into most spreadsheet program.

The information captured in the Set Summary file includes:

- Set Number
- Time, Day of Year, Year
- Gravity
- Set Standard Deviation
- Set measurement precision
- Set uncertainty
- Tide correction,
- Barometric correction
- Polar motion correction,
- Datum transfer correction
- Reference Xo correction,
- Temperature
- Pressure
- Auxiliary channels
- Number of drops accepted
- Number of drops rejected.


Erie 09 jan 02b.set.txt - Notepad

File Edit Format View Help

Source Data Filename: Erie 09 jan 02b
g Acquisition Version: 1.121700
g Processing Version: 9.120423

Set	Time	DOY	Year	Gravity	Sigma	Error	Uncert	Tide	Load	Baro	Polar	Transfer		Refxo	Tilt	Diffraction		SelfAttract	Temp	Pres	Chan5	Chan6	Accept	Reject
1	00:16:44	010	2002	979647290.831	10.244	1.030	2.267	-22.399	0.000	1.273	-6.664	91.506	-0.008	0.000	0.000	0.000	2.327	846.894	0.005	-0.018	99	1		
2	01:16:38	010	2002	979647288.936	9.188	0.933	2.225	18.923	0.000	1.712	-6.664	91.506	-0.009	0.000	0.000	0.000	2.319	848.355	0.005	-0.016	97	3		
3	02:16:41	010	2002	979647290.285	8.549	0.855	2.194	62.735	0.000	2.104	-6.664	91.506	-0.009	0.000	0.000	0.000	2.294	849.664	0.005	-0.014	100	0		
4	03:16:41	010	2002	979647292.578	9.434	0.943	2.231	101.224	0.000	2.221	-6.664	91.506	-0.009	0.000	0.000	0.000	2.290	850.054	0.005	-0.014	100	0		
5	04:16:41	010	2002	979647292.009	8.494	0.849	2.195	127.250	0.000	2.275	-6.664	91.506	-0.009	0.000	0.000	0.000	2.294	850.232	0.005	-0.015	100	0		
6	05:16:41	010	2002	979647291.425	8.228	0.823	2.185	135.743	0.000	2.631	-6.664	91.506	-0.009	0.000	0.000	0.000	2.304	851.419	0.005	-0.015	100	0		
7	06:16:41	010	2002	979647292.873	9.117	0.912	2.219	124.907	0.000	2.887	-6.664	91.506	-0.009	0.000	0.000	0.000	2.313	852.273	0.005	-0.016	100	0		
8	07:16:41	010	2002	979647292.881	8.202	0.820	2.182	96.698	0.000	3.031	-6.664	91.506	-0.009	0.000	0.000	0.000	2.313	852.754	0.005	-0.016	100	0		
9	08:16:41	010	2002	979647294.887	8.519	0.852	2.193	56.454	0.000	3.152	-6.664	91.506	-0.010	0.000	0.000	0.000	2.321	853.157	0.004	-0.016	100	0		
10	09:16:41	010	2002	979647296.308	8.670	0.867	2.198	11.733	0.000	3.334	-6.664	91.506	-0.010	0.000	0.000	0.000	2.331	853.765	0.004	-0.017	100	0		
11	10:16:41	010	2002	979647296.070	9.292	0.929	2.223	-29.399	0.000	3.487	-6.664	91.506	-0.011	0.000	0.000	0.000	2.340	854.273	0.004	-0.017	100	0		
12	11:16:41	010	2002	979647293.224	8.147	0.815	2.179	-60.220	0.000	3.578	-6.664	91.506	-0.011	0.000	0.000	0.000	2.346	854.578	0.004	-0.018	100	0		

Figure 5-5 Example Set by Set Summary File

6. TIDE CORRECTION MODELS

Berger 6-1
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  Ocean Load Files Section 6-3
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  Oceanloading Format 6-8
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g-software provides two Tide Correction methods, ETGTAB and Berger. Within each it is possible to incorporate an Ocean Loading model. Most users should use the modern ETGTAB routine, though the Berger model is also 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.

Users may choose different ocean tide 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 (**κ)** 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 (each drop). 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.

An example Berger setup dialog is shown in Figure 6-1. Access the Berger setup dialog by selecting **Setup** under the **Process** menu**.** From the **Control** tab page in the **Setup** dialog, select **Berger** from the drop down list then click Setup.

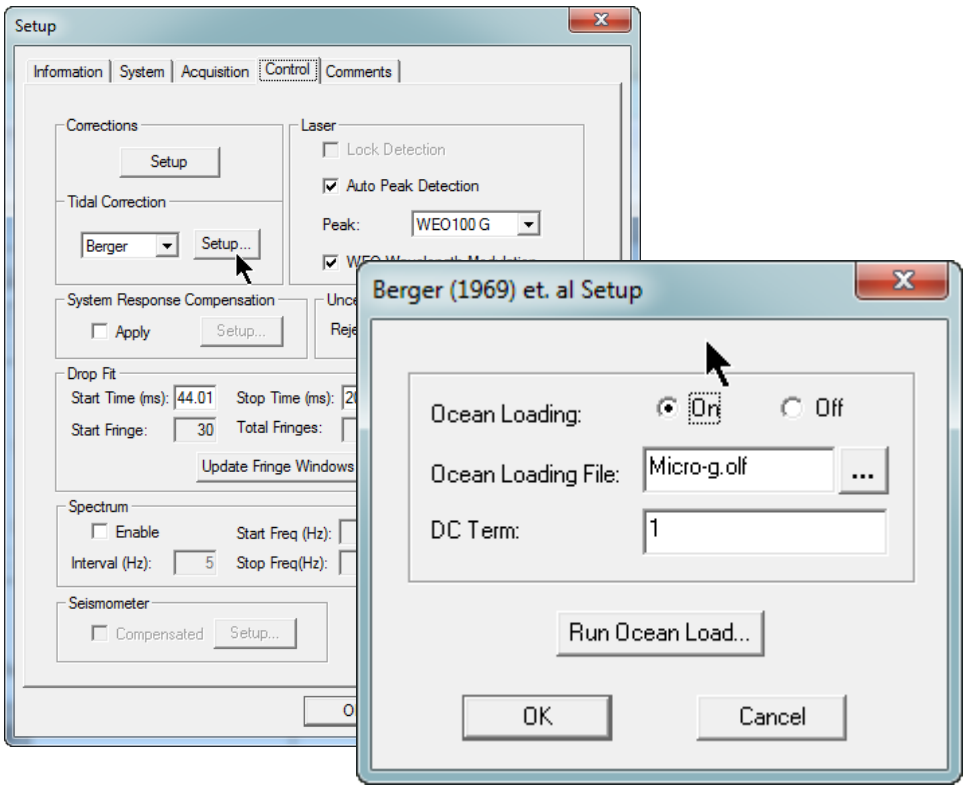

Figure 6-1 Setup Control Tab and Berger(1969) et. Al Setup Dialog

ETGTAB Setup

From the **Control** tab page of the **Setup** dialog, select **ETGTAB** from the drop down list box. Click the **Setup** button to display the **ETGTAB Setup** dialog shown in Figure 6-2.

The **ETGTAB Setup** dialog has two separate sections:

- Potential Filename
- Ocean Load Files
  - Delta Factor Filename
  - Ocean Loading Filename

For more advanced ETGTAB information contact Olivier Francis at (olivier.francis@uni.lu).

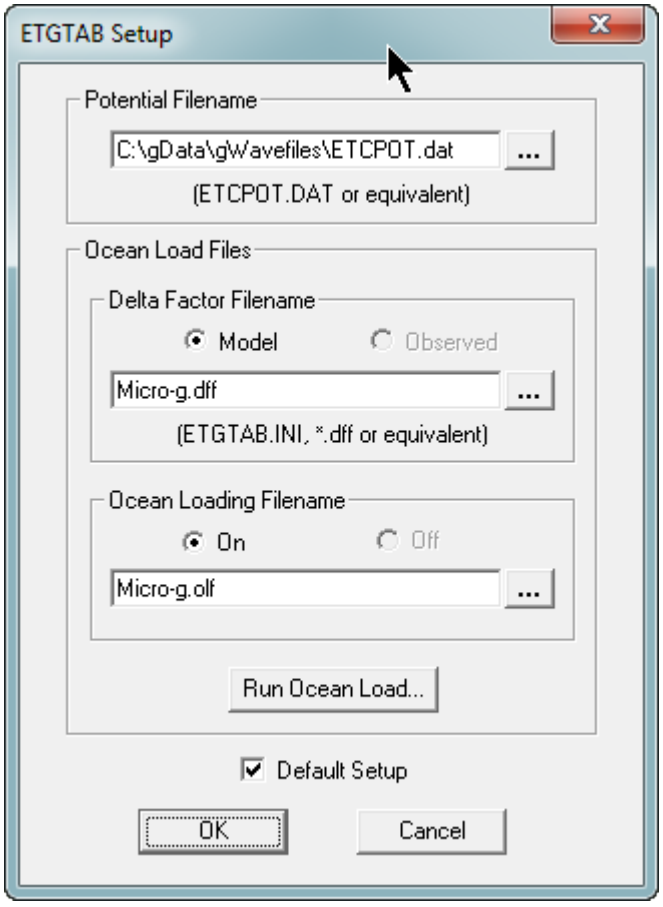

Figure 6-2 ETGTAB Setup Dialog Box

Potential Filename Section

Enter the Tidal Generating Potential File name in the **Potential Filename** section in the **ETGTAB Setup** dialog. The default filename is ETCPOT.dat and is located in the gWavefiles folder. The default file contains Tamura's potential.

Ocean Load Files Section

Tidal Parameters Filenames

The Tidal Parameters file can be supplied by the user or generated prior to data acquisition or reprocessing.

The default setup for g-software is enabled by checking the **Model** option in the **Delta Factor Filename** section of the **ETGTAB Setup** dialog and the **Default Setup** box located at the bottom of the dialog. A .dff file is generated by the Ocean Load (Model). The format of the file is shown in Figure 6-3

NOTE This setup does not contain any ocean loading component. Phase **κ** (Kappa) is set to zero.

If a compatible model or observed tidal parameter file for the gravity station is available, uncheck the **Default Setup** box and if applicable, check the **Observed** radio button in the **Delta Factor Filename** section of the **ETGTAB Setup** dialog.

NOTE An "Observed" Gravimetric Delta and Kappa Factors File contain the Ocean Loading component, and therefore the **Ocean Loading Filename** option is disabled automatically.

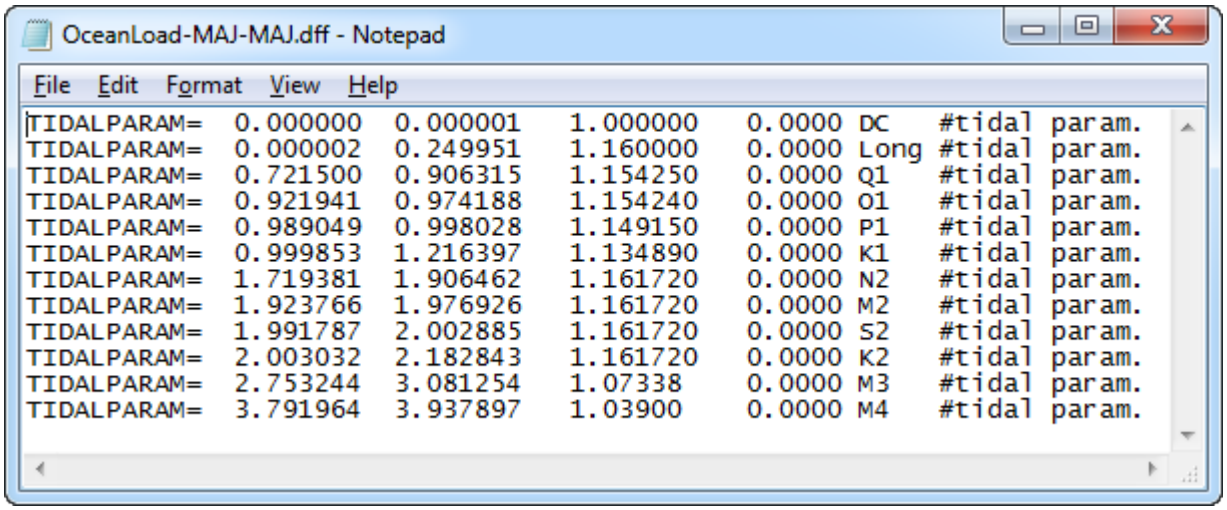

Figure 6-3 Example Oceanload.dff Delta Factor File Format

Delta Factor Filename

The ASCII text file, Oceanload.dff, 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. Refer to Figure 6-3 for an example .dff file.

Ocean Loading Filename

The ASCII text file, Oceanload.olf, contains the ocean load parameters (Wave, Amplitude and Local Phase listing). The file has an .olf extension by default and can be used with the Berger or the ETGTAB options. Refer to Figure 6-4 for an example .olf file.

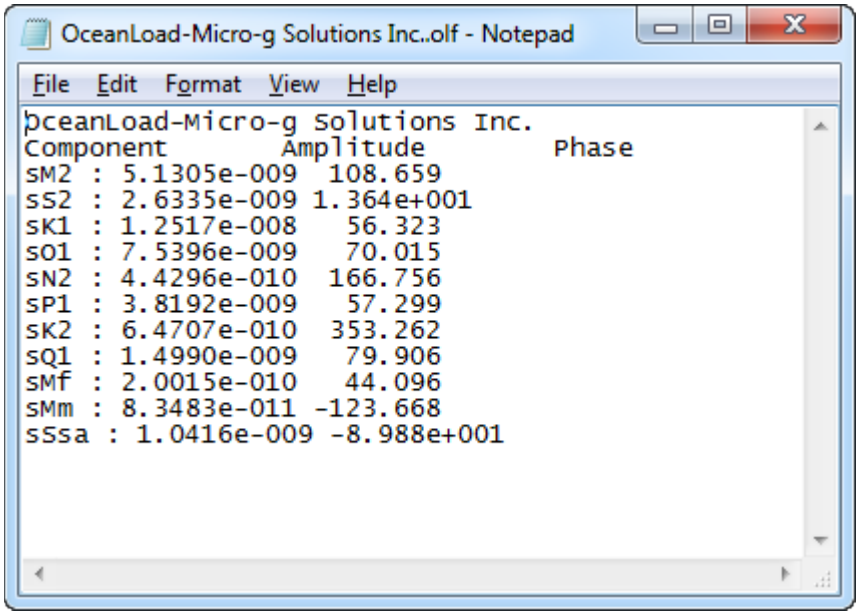

Figure 6-4 Example Oceanload Factor File Format

Previous version of g-software came with a separate tool for calculating OceanLoading. With the current version it is now built into the program. Two files are created by the OceanLoad tool (Delta Factor File, Ocean Loading File).

Base Name

It is recommended that the base name “Oceanload” be modified to something unique for the current instrument location. With g-software version 6 and greater, the site name is automatically appended to the Base Name of “Oceanload”.

For example, the Oceanload files for site TMGO are named “Oceanload-TMGO”. This helps avoid the situation in which the ocean load files for a different location are accidentally used in the calculation, resulting in the incorrect gravity value.

g-software uses the information from the **Information** tab in the **Setup** dialog to get all the data that it needs to create the Ocean Loading files.

The values it uses are:

- Name: Site name for the g-software 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, olivier.francis@uni.lu.

OceanLoad Dialog

To access the **OceanLoad** dialog, click the **Run Ocean Load** button in the **ETGTAB Setup** dialog**.** The above listed data are displayed. The **Base Name**, **Output Directory** and **Wavefile Directory** can be configured in this dialog if needed. Refer to Figure 6-5.

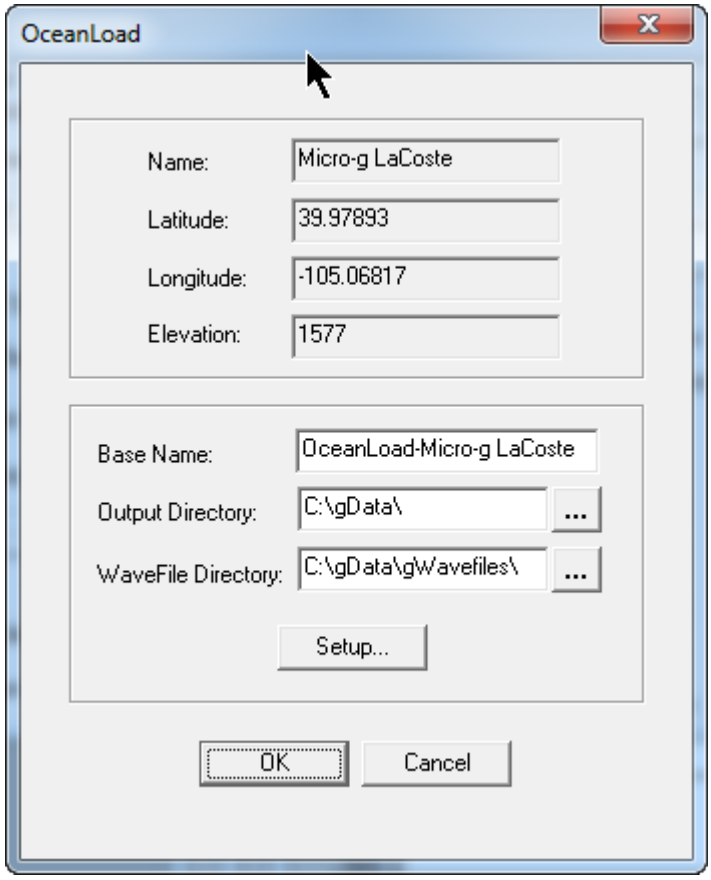

Figure 6-5 OceanLoad Dialog

Advanced Users

The **Load Terms** dialog allows the selection of three common ocean tide model for each term.

- Schwiderski
- FES2004
- CSR3.0

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

Load Terms Dialog

To access the **Load Terms** dialog:

- Click on **Setup** button on the g-software main window.
- Select the **Control** tab.
- In the **Tidal Correction** section, select the tide correction method then click **Setup** button.
- In the **ETGTAB Setup** dialog:
  - Configure the Potential Filename and Ocean Load Files section as appropriate.
  - Click the **Run Ocean Load** button.
- In the **OceanLoad** dialog:
  - Configure Base Name, Output Directory and WaveFile Directory for your site.
  - Click **Setup** button to display the **Load Terms** dialog. Refer to Figure 6-6.

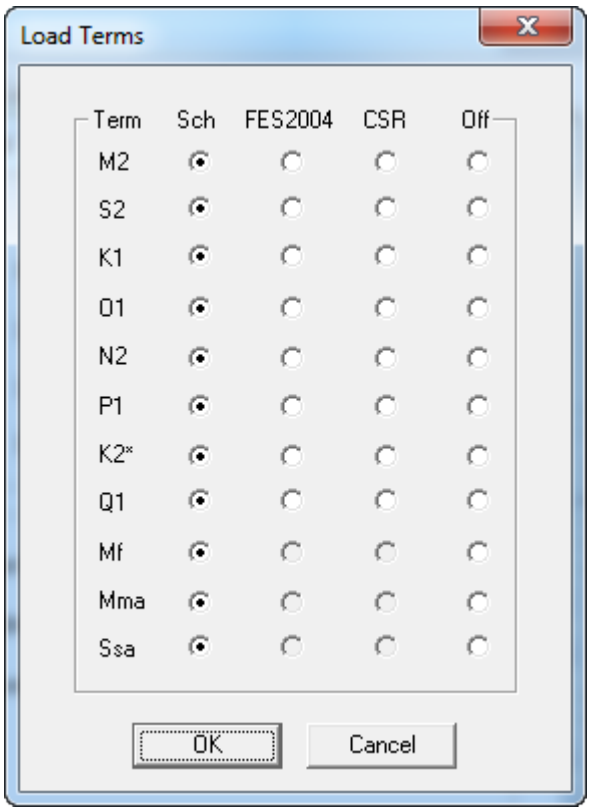

Figure 6-6 Load Terms Dialog

g-software allows users to use already existing OceanLoad files or it can dynamically create the necessary files that the user specifies on the fly.

Existing files

To use existing files, enable Ocean Load by clicking the check box in the **Setup** dialog option, and then search for the specified .olf and .dff files.

Create files

To dynamically create the files, enable Ocean Loading, and then pick a base name for the Ocean Load files. When g-software is run for the first time, a pop-up dialog prompts for confirmation to create the specified files.

Oceanloading Format

Depending on the information (modeled versus observed) contained in the tidal parameters file, an Ocean Loading file may

or may not be entered. Users may generate this file using the OceanLoad tool as explained above, or use their own data source.

g Binary Data Files Structure

Project Files (fg5)

g-software maintains a binary project file that contains all the station, system, acquisition, control and comments information used when occupying an absolute gravity station, as well as a list of all the names of the set files.

The g-software project files have the project name as the prefix and end in an .fg5 extension. For example, the gSampleData directory contains a project called “Erie 09 jan 02a.fg5

Gravity Set Files (.gsf)

The raw observation data for each set is stored in a binary gravity set file with a “gsf” extension. All the raw data including time of drop, fringe times and auxiliary sensor(s) data is stored in this file. The gravity set files must be accompanied by the corresponding project file in order to be processed by the g-software.

Set files are named sequentially based on the project file name, the number of the set, and the “gsf” extension. For example, in the gSampleData where the project name is “Erie 09 jan 02a.fg5”, the raw data file for the 5th set is named, “Erie 09 02a005.gsf”. The raw data file for the 12th set is named “Erie 09 02a012.gsf”.

IMPORTANT When transferring, sharing, or archiving g-software data, it is necessary to include the Project file (.fg5) and all of the gravity set (.gsf) files together.

The other files, *.txt, and project graphs, can be recreated by the software. It is not technically necessary to archive these files.

For g-software versions 6 at later, it is now possible to import and export all the project parameters and raw data in ASCII format. Refer to Section 7 “Import” or "Export" subsections for additional information.

7. MENU OPTIONS

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- Close 7-2
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The initial g-software main window opens with four of the eight menu options. Figure 7-1 shows an example of the initial g-software menu options (Project, View, Window, Help). Once a project is created, all eight menu options are available (Refer to Figure 7-2) and are described in the following sections.

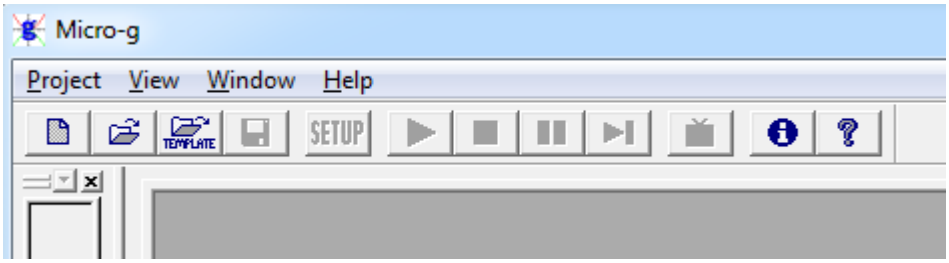

Figure 7-1 Initial g-software Main Window With Four Menu Options

One a project is started the Eight available menu options are:

- Project
- Edit
- View
- Process
- Options
- Output
- Window
- Help

Project Menu

The Project menu drop down selection list (Figure 7-2) includes:

- New
- Open
- Close
- Save
- Save as New Project ...
- Save as New Template ...
- Import
- Export
- Recent File
- Exit

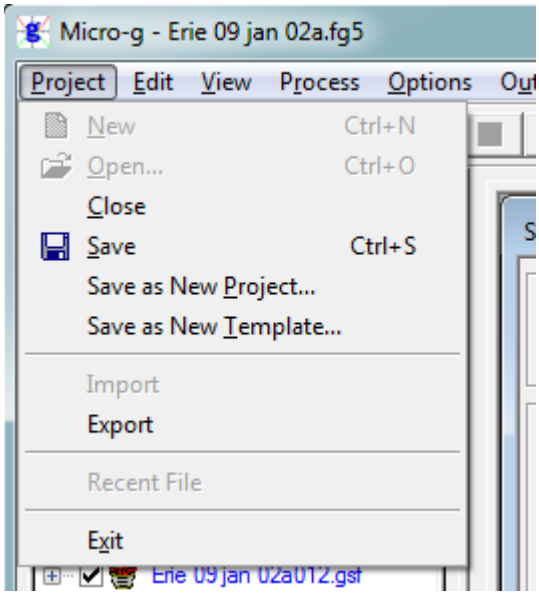

Figure 7-2 Project Menu Drop Down Selection List

New

The **New** option creates a new project file with all parameters set to the defaults. Change these options according to the project setup location, instrument and system, data acquisition parameters and control parameters. This includes the System Factory Height, Rubidium Clock Frequency, ML-1 Laser Wavelengths (for A10 and FGL instruments) as determined by Micro-g LaCoste, and the Laser Modulation frequency as determined by Winters Electro-Optics (WEO).

Open

The **Open** option opens an existing project file (*FG5 file).

Close

The **Close** option closes the current project file (*FG5 file).

Save

The **Save** option saves the current project file (*FG5 file).

Save As New Project

The **Save As Project** option allows you to save a copy of the current project file (*FG5 file) to disk, marking the file as real time (as opposed to Post Mission). The current project file (*FG5 file) is closed and the copy is opened.

Save As New Template

The **Save As New Template** option allows users to write a copy of the current project file to disk, marking the file as a *GTF. These files are usually not edited, and the user cannot acquire data with a *GTF file. *GTF files are meant to be used for creating new *FG5 files or other *GTF files.

Import

To import ASCII data:

NOTE The imported data must be in the identical format that is created by the g-software Export function.

- First create a New Project.
- Then select **Import**.
  - You are prompted to enter the <project name>.fg5.txt file name.
  - There must be a corresponding <project name>.gsf.txt file with the fringe data in the g-software format. g-software automatically opens this file.

The ASCII data are then converted to the standard g-software format for processing.

Export

g-software employs its own binary format when storing both the header (.fg5) and set gravity data (.gsf). For archiving and certain analysis purposes, g-software also allows the exporting and importing of ASCII data. Real time processing is still carried out using the g-software format, but in replay mode and an ASCII version of the data can be created by selecting Export. This creates two files that are editable with any plain text editor.

<project name>.fg5.txt

The <project name.fg5.txt file contains all of the project Setup information:

- Information
- System
- Acquisition
- Control
- Comments
- Processing information.

<project name>.gsf.txt

The <project name>.gsf.txt file contains all of the raw gravity data for all of the sets:

- Raw fringe times for every drop
- Associated analog sensor data

Recent File

The **Recent File** option is grayed out (Refer to Figure 7-2) and only becomes available when the current open file is closed. The **Project** menu then displays the list of the recently accessed project files. Refer to Figure 7-3. Users can now select a previously opened project file.

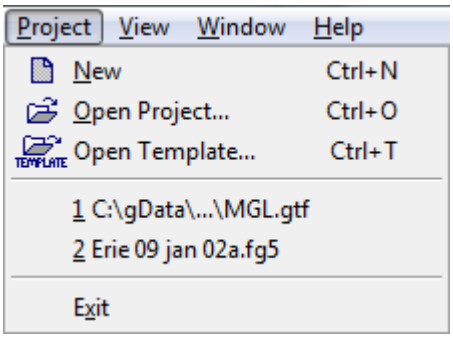

Figure 7-3 Example Project Menu Displaying Recent File List

Exit

The **Exit** option closes the g-software program.

Edit Menu

The **Edit** menu drop down selection list (Figure 7-4) includes:

- Reset
- Set Files
- Time Offset
- Program GPS

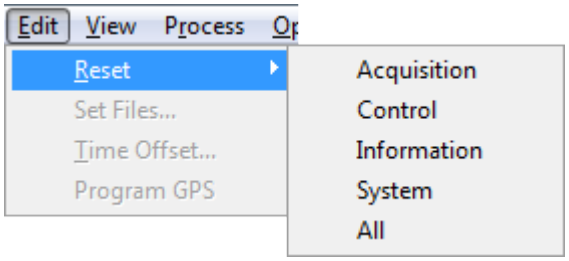

Figure 7-4 Edit Menu Drop Down Selection List

Reset

The **Reset** menu option allows users to reset all or reset selected project file parameters to the values at the time of original data acquisition. Refer to Figure 7-4 to see the list of parameter options.

Set Files

This option is for future use or for internal Micro-g LaCoste testing.

Time Offset

The **Time Offset** menu option allows application of a time shift in the event that the computer time was not set to the correct time.

To calculate the offset: (Refer to Figure 7-5)

- Change the **True Start Time** to the correct time (the time that should have been)
- Click on **Calculate.**
- Check the time offset as listed in the grayed edit box.
  - If the time offset is correct, check the **Apply Time Offset** option to make the time offset effective during processing.

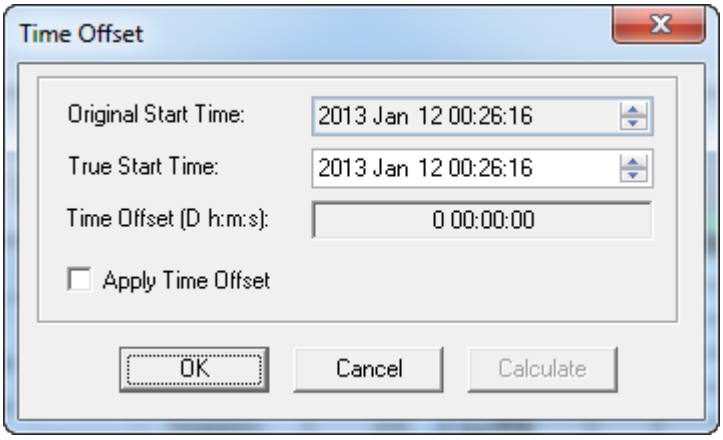

Figure 7-5 Project Time Offset Dialog

Program GPS

Initializes GPS receiver for communication.

View Menu

The four default views of the data appear when an acquisition project is started. Refer to Section 04 "Beginning Acquisition or Reprocessing" for additional information about each of the default views. The default views are:

- State
- Set Gravity
- Drop Gravity
- Drop Residuals

Figure 7-6 show an example View menu selection list.

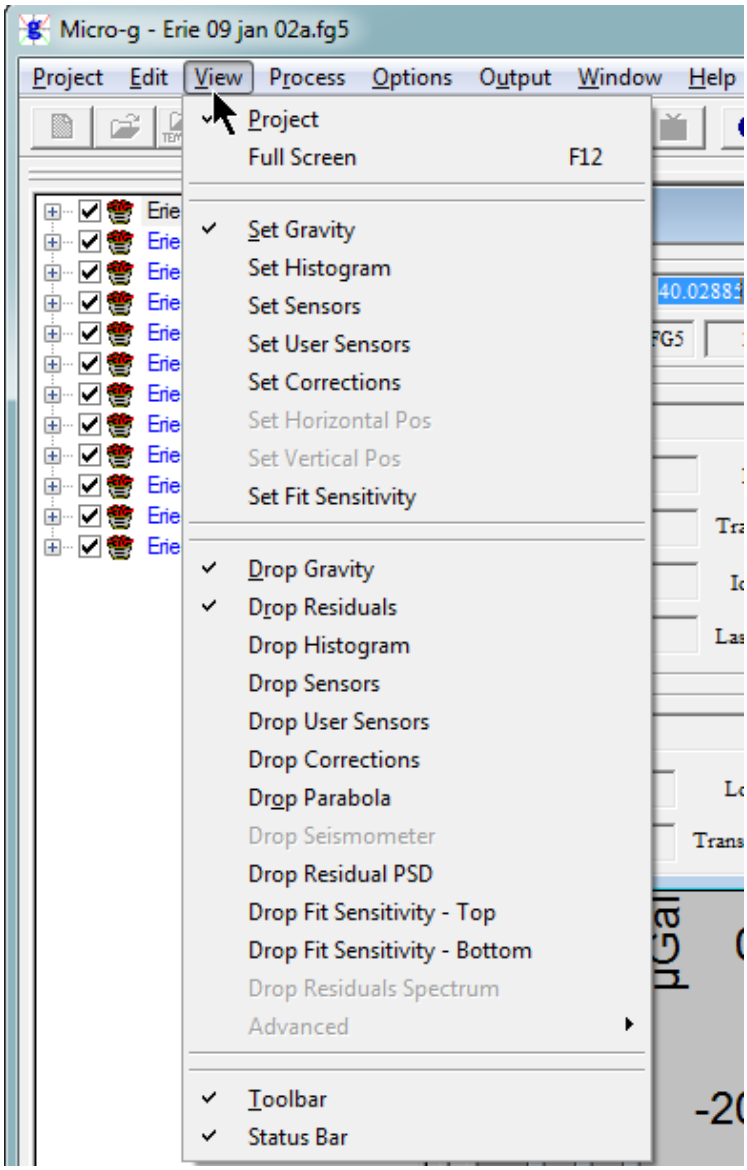

Figure 7-6 View Menu List

Process Menu

The **Process** menu drop down selection list (Refer to Figure 7-7) includes:

- Setup
- Rate
- Set Break Point

- Go
- Step
- Break
- Stop
- Quick Update
- View Channels

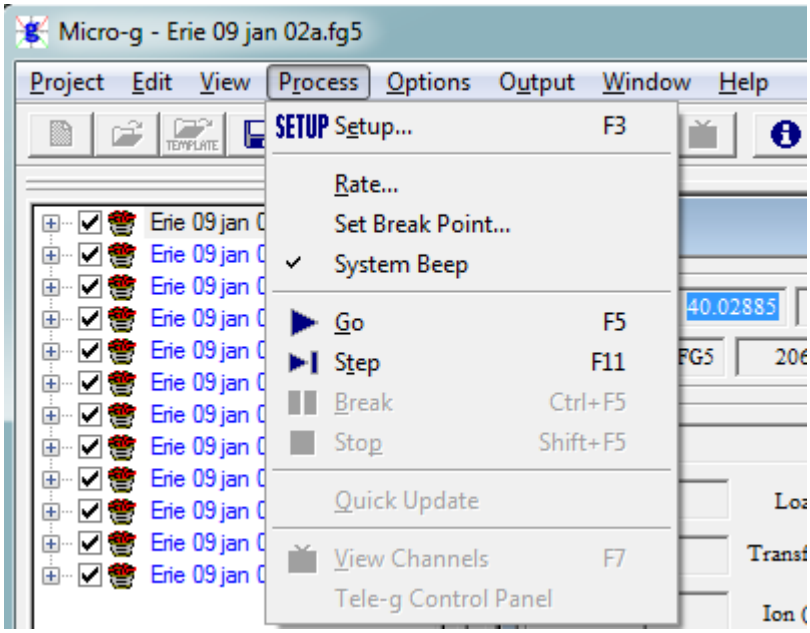

Figure 7-7 Process Menu Selection List

Setup

Use the **Setup** dialog to set the software parameters for data acquisition and processing. Figure 7-8 shows and example of the **Setup** dialog.

Refer to Section 03 "Real-time Data Acquitisition" for more information on setting the parameters for each of the tab sections.

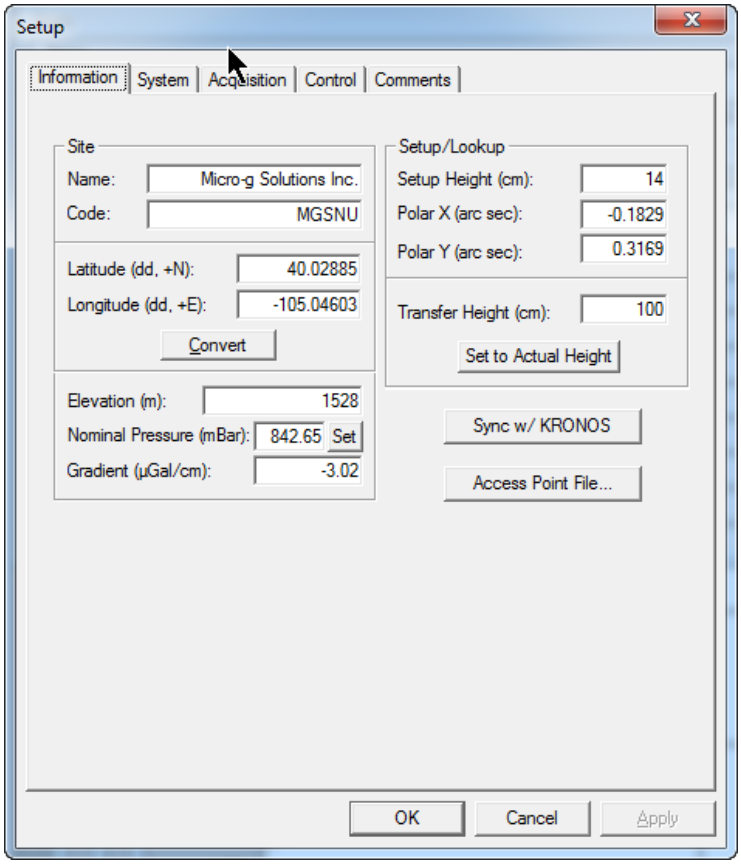

Figure 7-8 Setup Dialog

Rate

The **Rate** option sets the rate at which drops are processed in Post-Mission mode only. Refer to Figure 7-9. On some machines with slower graphics, it may be necessary to set the rate to 50ms or greater in order to avoid synchronization problems occurring between mathematical processing and graphical display.

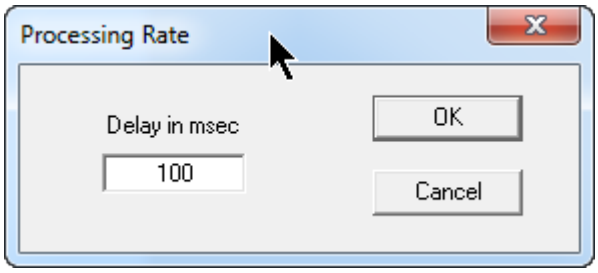

Figure 7-9 Processing Rate Dialog

Set Break Point

The **Set Break Point** option allows the manual setting of a break point in Post-Mission mode only. Refer to Figure 7-10. In general, it is much easier to set a break point from the tree menu. See Section 5 "Project Navigation Panel" for instructions on how to set a break point from the tree menu.

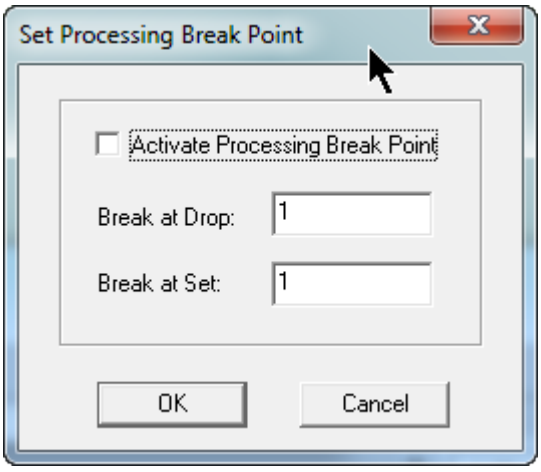

Figure 7-10 Set Processing Break Point

Go

The **Go** option starts the processing in both Post-Mission and Real-Time.

Step

The **Step** option allows users to view process drops step by step in Post-Mission mode only.

Break

The **Break** option allows user to pause processing and should only be used in Post-Mission mode.

Stop

The **Stop** option stops all processing in both Post-Mission processing and Real-time data acquisition.

Quick Update

The **Quick Update** option is enabled after all sets have been processed. **Quick Update** is used to discard Sets from the list used in the final determination of the absolute value of gravity.

After the sets are deselected on the tree, **Quick Update** updates the project number according to the last setup of the processing parameters. If any processing parameters change **Quick Update** automatically reprocesses all selected sets.

View Channels

The **View Channels** option allows users to view data channels before and after processing. This is used to determine what data is coming in from channels without having to process any of the data. Figure 7-11.shows an example of the Live Channel view dialog.

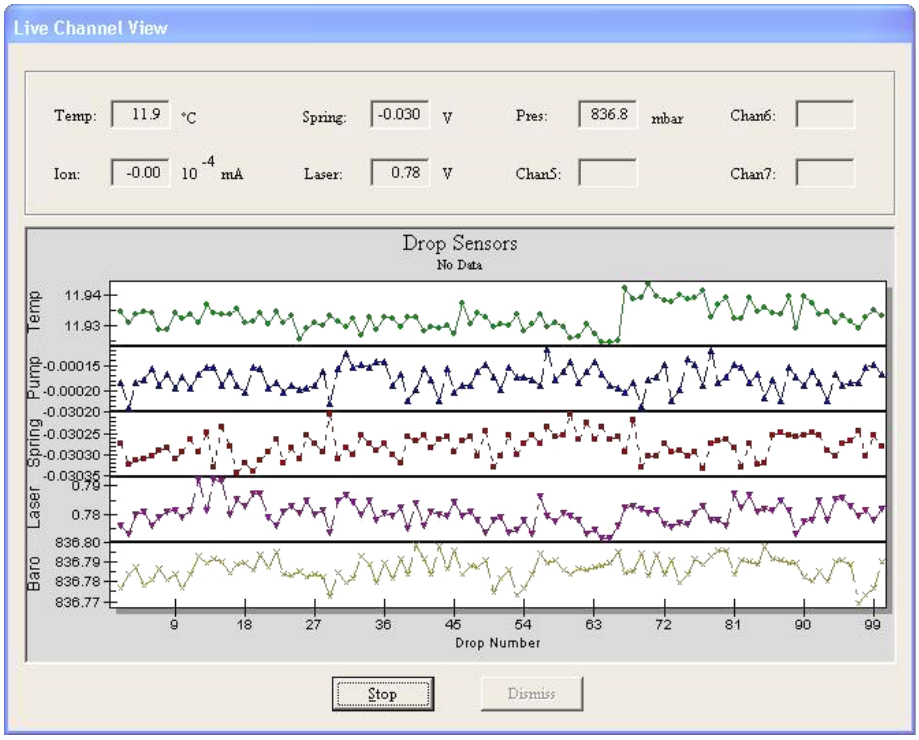

Figure 7-11 View Channel Live Update Dialog

Tele-g Control Panel

The Tele-g Control Panel option is only available if a serial A2D communication card is used. It allows users to check and adjust various components of the system. Users can:

- Zero and Servo the Super Spring
- Zero the Tiltmeter
- Monitor Fringes
- Monitor sphere position

To initialize the Tele-g Control Panel, click on **Connect**. This gathers information from the system and allows the user to make adjustments. The information gathered enables or disables certain features that are available. The Tele-g Control Panel defaults to Super Spring/Tiltmeter adjustments.

To view Fringes or Sphere, click **Initialize** and the graph automatically changes and begins data acquisition.

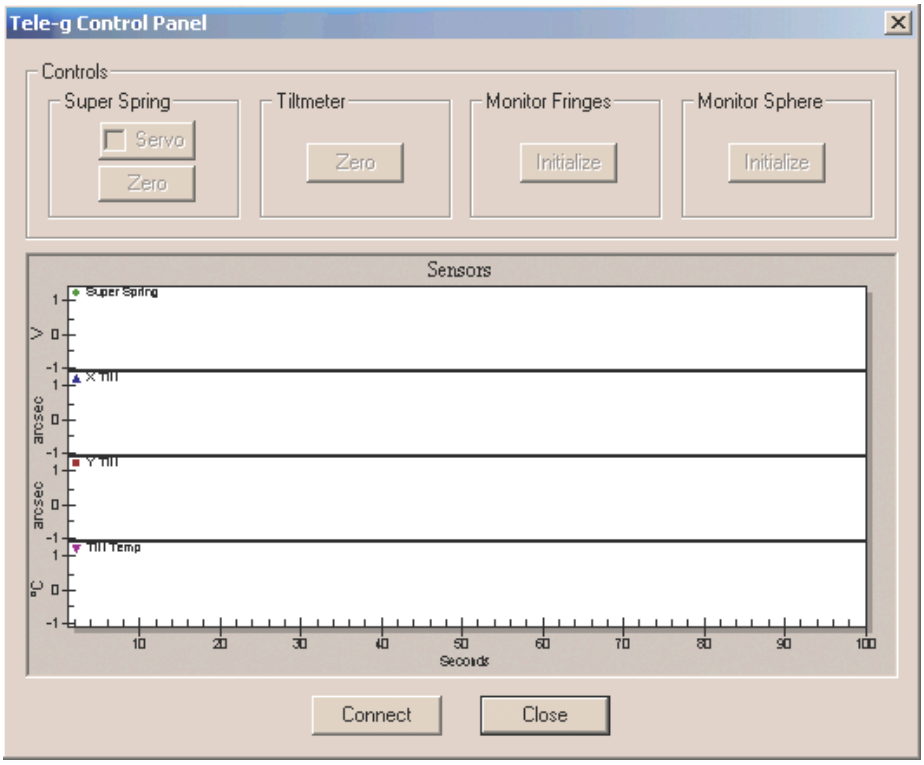

Figure 7-12 Tele-g Control Panel

Options Menu

The **Options** menu drop down selection list (Refer to Figure 7-13) includes:

- E-mail
- Graphics
- Protection

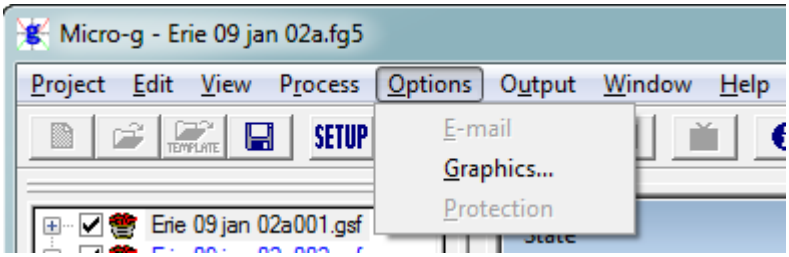

Figure 7-13 Options Menu List

E-mail

For system controllers with an internet connection, g-software can be set up to send periodic e-mails with real time processing results. By default the e-mail notification is off. Figure 7-14 shows the **E-mail setup** Notification Dialog Box.

A valid mail server (**Server**), a valid identity for that server (**From**) and a valid recipient (**To**) must be entered.

NOTE Any e-mail errors encountered are suppressed to avoid interference with data acquisition.

When **E-mail Sent i**s enabled, the default information is sent. To exclude information uncheck the check box in the **Included Data In Body** section.

- **Project Gravity** (Current total project gravity value)
- **Set Scatter** (Current set scatter)
- **Set Gravity** (Gravity value of the last completed set)
- **Drop Scatter** (Drop scatter of the last completed set)
- **Uncertainty** (Total project uncertainty)
- **Number of Sets** (The number of the last completed set)
- **Project File** (A copy of the latest version of the project.txt file is attached.)

- **Set File** (A copy of the latest version of the set.txt file is attached.)

The **E-mail Sent** drop down notification selection list includes:

- Never
- After every completed set.
- After every other completed set.
- Only at the end of a completed project.

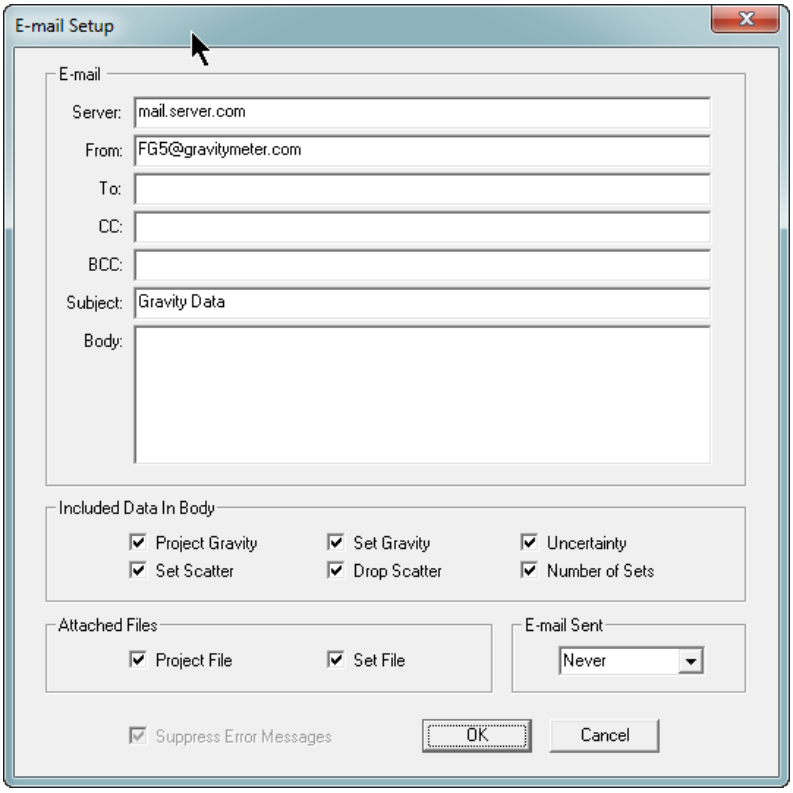

Figure 7-14 E-mail Setup Notification Dialog

Graphics

The **Graphics** option allows users to manually set all scales in the graphs. Graphical scales are saved to the project file. Figure 7-15 show an example Graphics Setup dialog.

The "Stored Graphs" mode can be enabled or disabled. Stored Graphs, when enabled, allows users to click on a particular drop or set in the tree view, and view the last data that was stored. Click the **Enable Stored Graphs** check box in the **Graphics Setup** dialog. Refer to Figure 7-15.

NOTE To work properly the Stored Graphs mode must be enabled before processing the data.

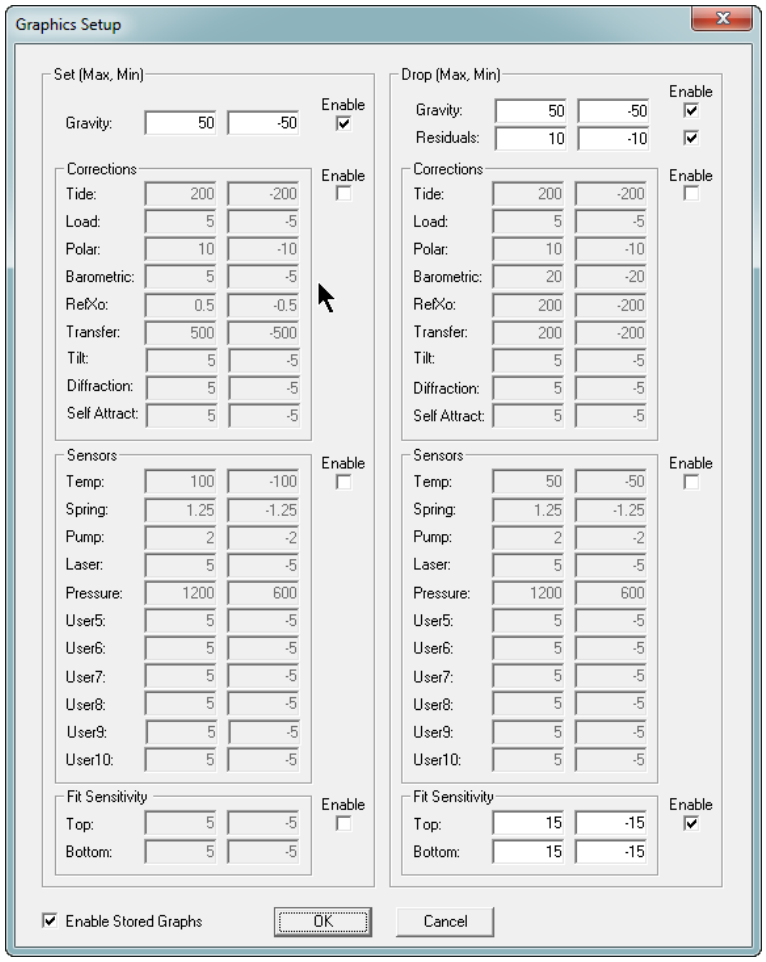

Figure 7-15 Graphics Setup Dialog

Protection

This option is for future use or for internal Micro-g LaCoste testing.

Output Menu

There are four options available under the **Output** menu. Refer to Figure 7-16.

- Text
- Graphics
- Raw Dump
- Fringe Dump

By default, g-software outputs a text file for the Project Summary and the Set by Set Summary.

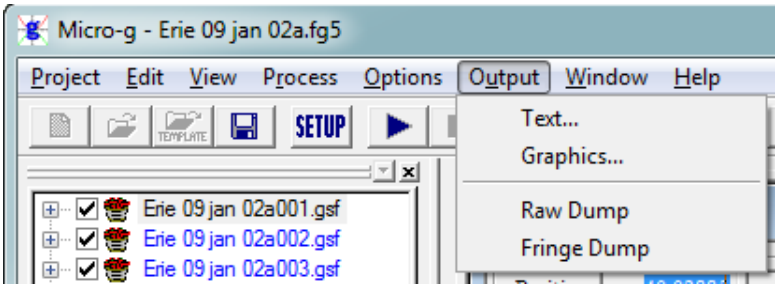

Figure 7-16 Output Menu List

Additional information can be added to the file such as:

- Drops
- Graphics (.jpg image of the displayed view)
- Raw Data

These options must be selected in the **Output Selection** dialog before processing the data. Refer to Figure 7-17 and Figure 7-18.

NOTE	The view must be opened for g-software to save the graphical images.

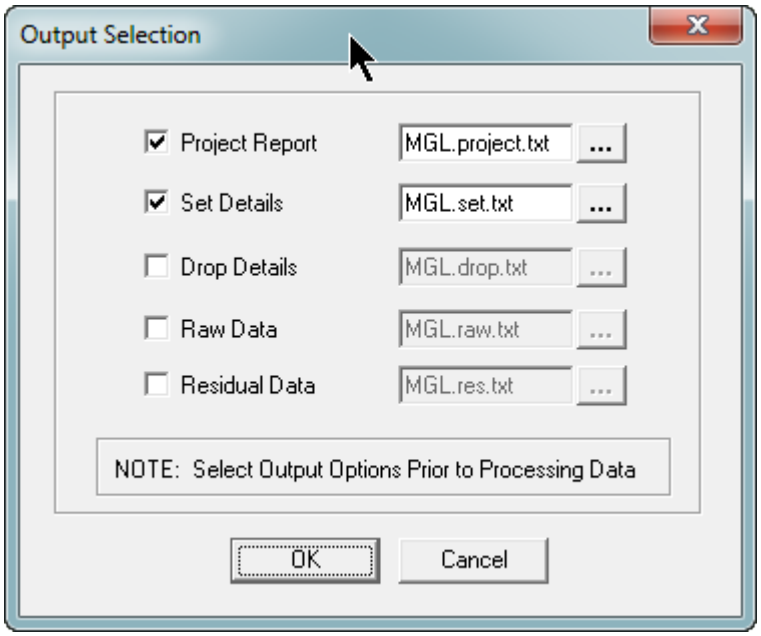

Figure 7-17 Text Output Selection Setup Dialog

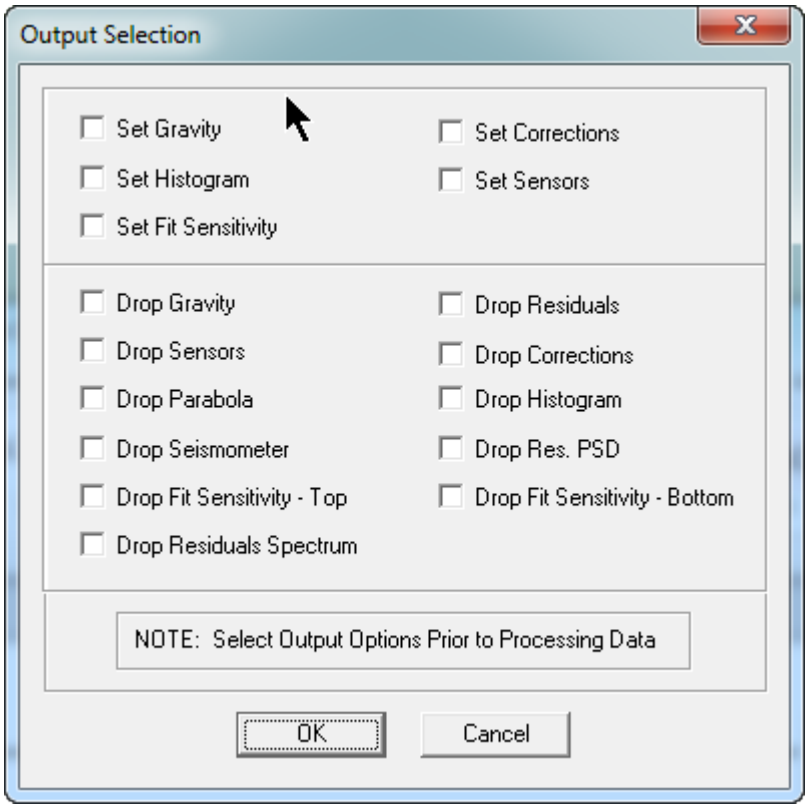

Figure 7-18 Graphic Output Selection Dialog

Window Menu

The **Window** menu provides display selection choice of **Cascade** or **Tile** format. The currently selected data views are also listed.

Help Menu

Information about the g-software version and a pdf of the g-software Absolute Gravity Data Acquisition And Processing Software User's Manual can be accessed from the **Help** menu.

8. ADDITIONAL UTILITIES

Convert Utility 8-1
Input File 8-1
Sensor File 8-1
Output Project 8-2
ProjectMerge Utility 8-3
Output Directory 8-3
Final Project Name 8-4
Merge Files 8-4
Add File 8-4
Remove File 8-4
Merge 8-4
gProjectCopy Utility 8-5
Input File 8-5
New Project 8-5
Copy 8-5

The g-software additional utilities are located in the bin folder. There are three additional utilities:

- Convert.exe
- ProjectMerge.exe
- gProjectCopy.exe

Convert Utility

The **Convert** utility is used for converting legacy files obtained with Olivia DOS software into the new g-software format. Figure 8-1 shows an example of the **Convert** dialog.

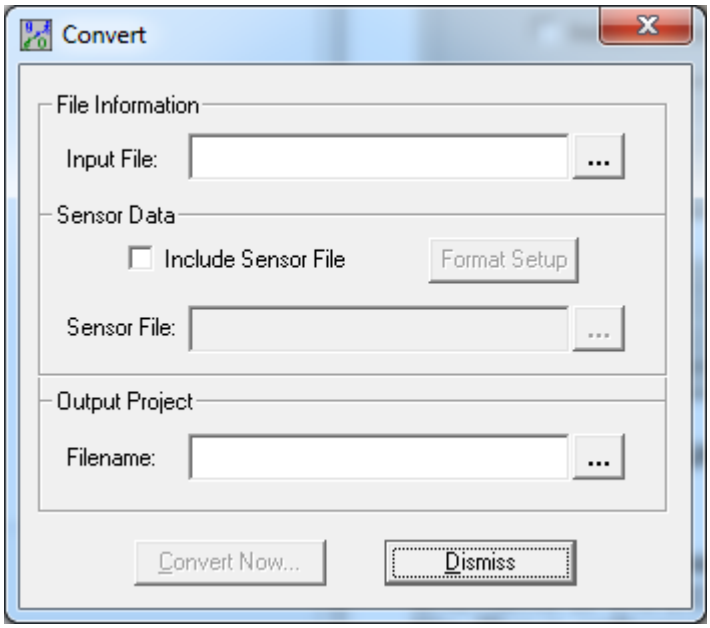

Figure 8-1 Convert Utility Dialog

Input File

In the **File Information** section, **Input File** is the path location and name of the DDT or compatible binary absolute gravity data file. The g-software **Convert** utility supports most DDT files but may not support some versions. If you have trouble converting files, please contact Micro-g LaCoste.

Sensor File

In the **Sensor Data** section, check the **Include Sensor File** box if sensor data is to be included. The **Sensor File** is the base name to be used with the g-software project file.

Click the **Format Setup** button to configure the sensor file format. Refer to Figure 8-2.

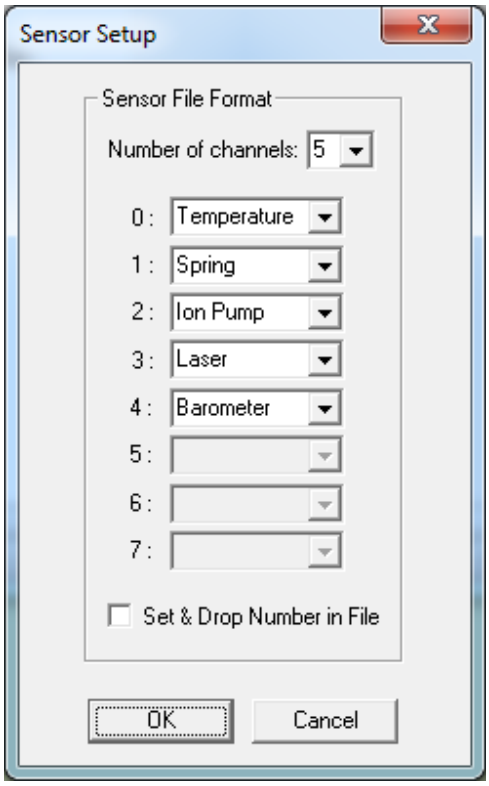

Figure 8-2 Sensor Setup Dialog.

Output Project

The **Filename** in the **Output Project** section is the location for all g-software converted files (FG5 and *.gsf).

ProjectMerge Utility

The **ProjectMerge** utility is a program that lets users combine multiple projects into one single project file. This is useful in the case when data acquisition is interrupted and a single project is desired. Figure 8-3 shows the ProjectMerge interface.

NOTE

The ProjectMerge utility assumes that all acquisition parameters are identical (i.e. A run was stopped after a few sets, and a new project was created and begun immediately).

ProjectMerge is **not** intended to combine projects with different parameters. Doing so is at your own risk.

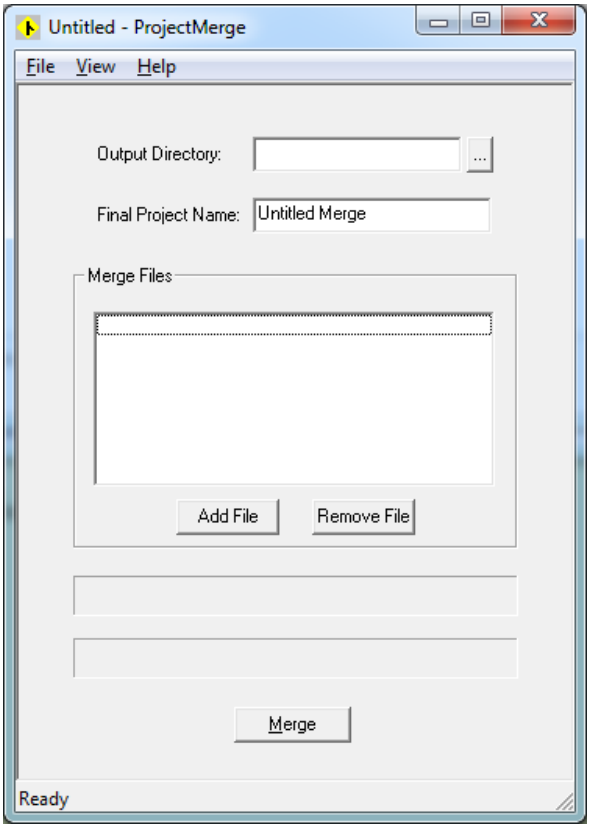

Figure 8-3 ProjectMerge Utility Dialog

Output Directory

The **Output Directory** is the location of the merged project.

Final Project Name

The **Final Project name** is the name which the merged project is saved as.

Merge Files

The **Merge Files** are the list of files to be merged together to create the merged project.

Add File

The **Add File** button is for adding more files to the **Merge Files** list.

Remove File

The **Remove File** button removes files from the **Merge Files** list. It removes the selected file.

NOTE	If no files are selected the first file on the list is removed.

Merge

Click the **Merge** button to start merging the files.

gProjectCopy Utility

The **gProjectCopy** utility is a program that lets users easily change the name of their projects. This is useful if the name of a project has an incorrect name or needs to be changed. This utility renames all of the files associated with the .fg5 file.

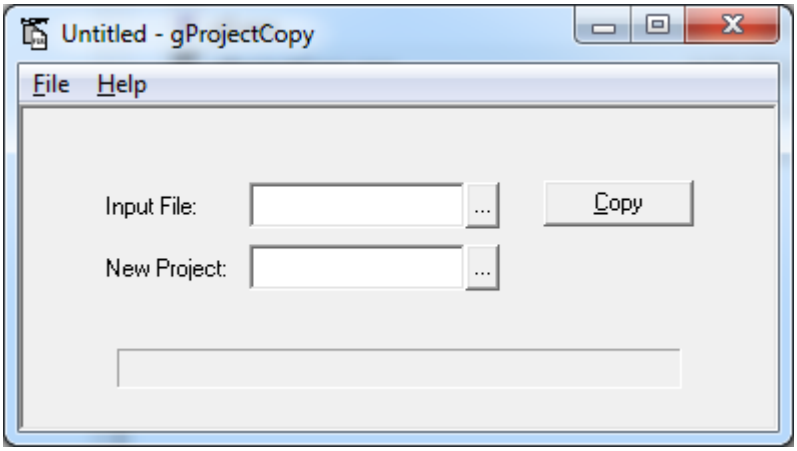

Figure 8-4 gProjectCopy Dialog

Input File

The **Input File** is the file to be copied.

New Project

The **New Project** is the name of the output project name.

Copy

The **Copy** button starts the copying process.

9. LICENSE, SUPPORT AND MAINTENANCE

License 9-1
Support 9-1
Maintenance 9-1

License

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

Support

Questions concerning the operation of the g-software and any problems using g-software should be directed to:

aaron@microglacoste.com

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

Maintenance

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