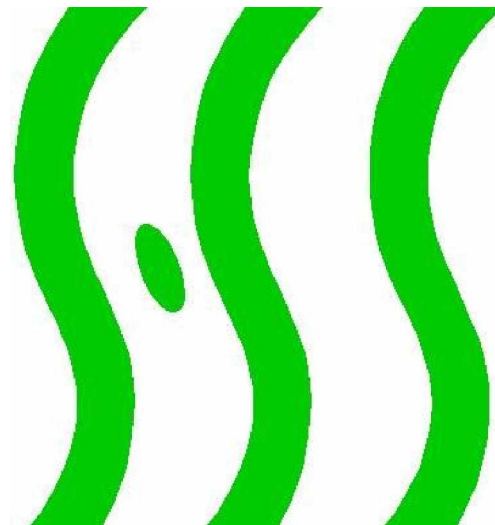




by





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SAFETY

This product has been designed and tested to be a safe and “environmentally friendly” device. To ensure safe operation and to keep the product safe, the information, cautions, and warnings in this manual must be followed.

CERTIFICATION

Holland Scientific certifies that this product met its published specifications at the time of manufacture. Accuracy of the data recorded by this data acquisition system depends on the user adhering to the procedures published in this manual.

WARRANTY

Holland Scientific warrants this product against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Holland Scientific will, at its option, either repair or replace products that prove to be defective.

For products returned to Holland Scientific for warranty service, Buyer shall prepay shipping charges to Holland Scientific and Holland Scientific shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Holland Scientific from another country.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

Information in this manual is subject to change without notice. No liability is assumed for damages resulting from the use of this information, device or software described.

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GeoSCOUT GLS-400 Operators Manual

1. Product Overview

1.1 Introduction

The GeoSCOUT series dataloggers are easy-to-use and reliable tools for collecting georeferenced data from the Holland Scientific ACS-210 and other sensors that provide RS-232 text-based data streams. Georeferenced sensor data are stored in a text format on SD flash cards with storage capacities up to 1 Gigabyte. Data can easily be accessed by third party map rendering software. Instrument configuration is performed using easy-to-navigate menus. Configuration settings are saved in nonvolatile memory to be utilized by the GeoSCOUT to configure the instrument every time it is operated. Figure 1 below shows the main features of a GeoSCOUT GLS-400.

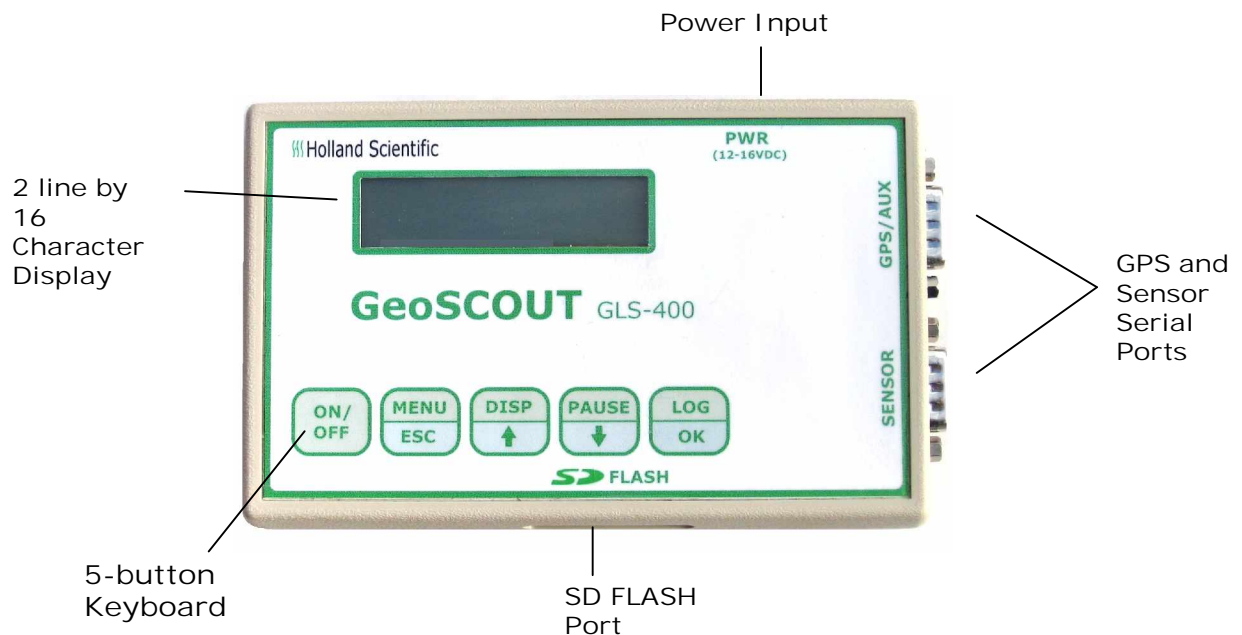


Figure 1. GeoSCOUT GLS-400 Geographical Datalogger.

1.2 Specifications

The following specifications are subject to change without notification

Specifications: (Preliminary)

Memory Type: SD FLASH

Memory Capacity: 64 MB to 1 GB

File System: DOS FAT compatible

Display: 2 line by 16 character temperature compensated LCD

Backlight Control: User selectable; 4 levels

GPS COMM Port: 2400, 4800, 9600, 19200 and 38400 baud; no parity, 8 data bits and 1 stop bit

GPS Sample Rates: Detects and logs GPS data streams updated at 1 and 5 Hz

Sensor COMM Port: 1200, 2400, 4800, 9600, 19200 and 38400 baud; no parity, 8 data bits and 1 stop bit

RS-485 Port: 500k baud half-duplex, multi-drop; supports up to 200 devices

Serial Port Connector: Male DB-9 connector

Power Requirements: 8VDC to 16VDC @ < 100 mA (backlight turned off)

Operating Temperature: 0F to 131F (-18C to 50C)

Dimensions: 5.4 in. (13.7 cm) X 3.6 in. (9.1 cm) by 1.1 in. (2.8 cm)

Enclosure: Injection molded, ABS material

2. Getting Started

2.1 Your First Measurement

The connections necessary to make sensor and GPS readings are shown in Figure 2. When using a GPS not supplied by Holland Scientific, please be sure to enable the GPRMC and GPGGA data strings (you may need to consult your GPS sensor's user guide in order to configure the output strings). The GeoSCOUT supports GPS baud rates up to and including 38400 baud. There is no need to manually select the baud rate; the GeoSCOUT will automatically detect the GPS baud rate.

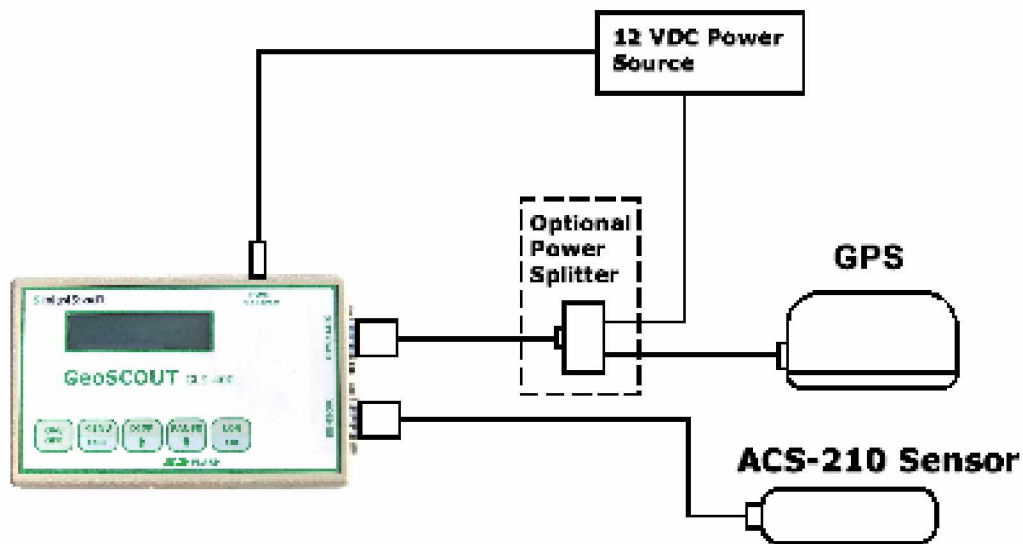


Figure 2. GeoSCOUT GLS-400 system set up and configuration.

To begin collecting data, please follow the steps listed below:

Step 1) Connect sensor, power and GPS to the GeoSCOUT as shown in Figure 2

Step 2) Insert an SD flash card into the GeoSCOUT card slot. An SD flash card has the form factor shown to the right. Be sure the SD flash is formatted for the DOS FAT file system format. The flash card supplied by Holland Scientific will be formatted with the proper file system. Note, most SD flash cards come formatted in FAT format as opposed to FAT-32. Please see Appendix B for details on formatting flash cards. When purchasing flash cards, be sure they have the SD logo on them. The GeoSCOUT is not compatible with MMC cards.



Step 3) Press the ON/OFF button. The GeoSCOUT start-up prompt will display followed shortly by the "Select Sys Mode" prompt.

Step 4) Use the UP Arrow to select the MAP mode. The data acquisition indicator will change from PLOT to MAP. Press the OK button. The GeoSCOUT will search for the GPS by testing each baud rate spanning from 1200 baud to 38,400 baud. When the GPS is detected the display will state that the GPS is "On-Line".

Step 5) After a few seconds, the GPS will lock-in (S:V will change to S:A; F:0 will change to F:1 (GPS FIX) or F:2 (DIFF GPS FIX)). You will need to be outside for a proper GPS fix. After the display indicates these changes, press the LOG button. The GeoSCOUT will now begin taking data. The sample number advancement is indicated on the GeoSCOUT's display.

When you are through collecting data, press the LOG button to stop the data acquisition process. This will close the data file stored on the flash card. You may now remove the flash card by pushing on the card. It will click and pop out slightly from the slot. Pull the card from slot and place it into a card reader connected to your PC in order to access your sensor data.

2.2 GeoSCOUT User Interface

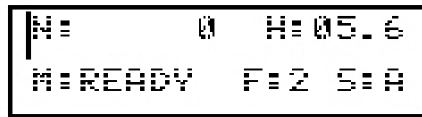
The front panel of the GeoSCOUT has a 2-line by 16-character LCD display and five command buttons to select operation options and to facilitate data collection. The user can navigate the GeoSCOUT's three modes of operation using the keyboard.

The 3 modes of operation are:

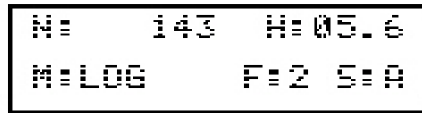
Operational Mode	Mode Description
Standby	This mode allows the user to enter the CONFIG Mode, LOG Mode or scroll through GPS and sensor data on the display by pressing the DI SP button.
Configuration (CONFIG)	This mode is entered by pressing the MENU button while the sensor is in the Standby Mode. Pressing this button while in the LOG Mode has no effect.
Log	This mode allows the user to log sensor data to a file contained on the SD flash card. Logging is initiated and terminated by pressing the LOG button. Logging can be paused and resumed by pressing the PAUSE button. Use of the DI SP button allows viewing of the various sensor and GPS parameters.

Sample GeoSCOUT screens for the various modes are shown below, see Figure 3. When in the STANDBY mode, the LCD will display READY next to the mode indicator (M:). GPS status values are displayed next to the HDOP (H:), NAV status (S:) and fix type (F:) indicators. The samples indicator (N:) will have a value of zero displayed. The system status indicator (M:) has three possible display values: READY, LOG, or PAUSE. The value displayed is dependent on the acquisition state of the GeoSCOUT. When actively logging data the system status indicator will display LOG. When the GeoSCOUT is in the pause state the system status indicator will read PAUSE.

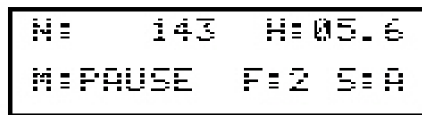
STANDBY/LOG Mode



GeoSCOUT STANDBY Mode

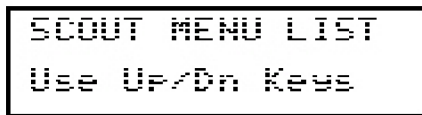


GeoSCOUT LOG Mode



GeoSCOUT in paused state

MENU Mode (Title Menu)



GeoSCOUT CONFIG Mode, use of the up and down buttons will display the various configuration options

Figure 3. Example GeoSCOUT Display Screens

Keyboard button functions are defined as follows:

ON / OFF



This button is used to turn the data logger ON and OFF. In the ON position, power is provided to both the GPS and SENSOR via the serial ports. For GPS units supplied by Holland Scientific, the GPS will

receive its power through the GPS serial port. When auxiliary automobile power (cigarette lighter) cords are used to power GPS units, these cords should be short circuit protected via use of an inline fuse.

MENU / ESC (escape)



This button allows the user to enter the CONFIG mode to make changes to the GeoSCOUT's configuration. When in the CONFIG mode, the MENU/ESC button works as the escape button to exit submenus with out making changes to settings. When changes to the GeoSCOUT configuration are complete, the menu mode can be exited by pressing MENU/ESC button to return to the STANDBY mode.



DISP (Display) / UP Arrow When the GeoSCOUT is in the STANDBY and LOG modes, this button allows the user to scroll through the sensor and GPS parameters. When in the CONFIG mode, this button functions as the UP Arrow for scrolling through the various menu and submenu options. In the STANDBY and LOG modes, users can view the sensor and GPS data being collected by the GeoSCOUT. Each time the DISP button is pressed, the display screen will advance to the next data set. The first few data screens show GPS and system information while the latter screens show sensor data.

PAUSE / DOWN Arrow



When in the LOG mode, this button allows the user to pause the data collection process. Pressing the button again while the GeoSCOUT is paused will resume data collection. When the GeoSCOUT is in the CONFIG mode, this button functions as the DOWN Arrow to scroll backward through the various menu and submenu options.

LOG / OK



This button is used to commence data collection causing the GeoSCOUT to enter the LOG mode. While in the LOG mode, pressing this button will terminate data collection and close the data file written to the SD flash card. When in the CONFIG mode, this button allows the user to acknowledge (i.e., "OK") that the user wishes to change the option displayed.

2.3 Configuring the GeoSCOUT

Configuration Options – When in the CONFIG mode, users can scroll through the following options using the UP and DOWN keys. Within each option, various submenu options exist and are as follows:

Backlight Adjustment

This feature allows the user to set four levels of backlight intensity. By using the UP and DOWN buttons, the intensity of the backlight can be changed. The intensity can be selected by pressing the OK button. Press the ESC button to return to the main menu without changing the backlight setting.

Find GPS

Pressing the OK button causes the GeoSCOUT to search for the proper GPS connection. Once the GeoSCOUT finds the appropriate baud rate, it will display "On-Line". If no GPS is used, the GeoSCOUT will scan all baud rates and direct users to check the connections.

GPS Logging Configuration

This submenu feature allows various GPS parameters to be logged into the data file. The GPS parameters are described below:

GPS Parameter	Description/Function
Interpolate GPS (ON or OFF)	This function allows spatial interpolation of data points between successive GPS location data points
Elevation (ON or OFF)	Antenna elevation parameter in meters
Fix Type Log (ON or OFF)	*Differential fix type: 0- No Fix 1- GPS Fix 2- Differential Fix 6- Estimated
UTC Time Log (ON or OFF)	Universal time stamp
Speed Log (ON or OFF)	Vehicle speed parameter in kph
Course Log (ON or OFF)	Vehicle course in degrees from in a clockwise direction

*Consult your GPS sensor's user guide for accuracy specifications as they relate to fix type enumerations

Annunciator

Use the Up/Down Arrows to select the beeper mode. Press the OK button to except selection or press the ESC button to return to the main configuration menu.

Set Sensor Type

Crop Circle ACS-210
Geonics EM-38 (to be implemented in 2006)
Serial Device (to be implemented in 2006)

Configure ASC-210 (to be implemented in 2006)

Set Sensor Address
Set Sample Rate
Set Output String
Set Output Mode
Set Network Mode
Set Baud Rate

2.4 Datalogger Operation

The GeoSCOUT has two data acquisition modes. These are the MAP mode and the PLOT mode. One of these two modes is selected by the user when the GeoSCOUT is powered up. If the MAP mode is selected, a GPS is required for proper operation of the GeoSCOUT. The PLOT mode does not use the GPS signal and subsequently ignores the GPS if it is connected to the GeoSCOUT.

MAP Mode:

When the MAP mode is selected, the GeoSCOUT will collect both GPS and sensor data and store this data to a comma separated variable (CSV) file on the SD flash card. Data can be later retrieved and analyzed using third party map rendering software. Data collection is initiated by pressing the LOG button and data collection commences automatically. Data collection can be paused by pressing the PAUSE button. To resume data collection, press the PAUSE button again.

PLOT Mode:

When the PLOT mode is selected, the GeoSCOUT will collect only sensor data and save this data to a text file on the SD flash card. The file format will include a plot number (starting at 1) followed by the sample number within the plot followed finally with the sensor data. Data collection in the PLOT mode can be initiated via pressing the LOG button. The GeoSCOUT will respond by initializing the plot number and sample number on the LCD display. By pressing the PAUSE button, the GeoSCOUT will begin storing data to the SD flash card. When the PAUSE button is pressed again, data collection will stop. Pressing the pause button again will begin data collection again first by advancing the plot number and clearing the sample counter and then by saving sensor data to the SD flash file.

File naming in both the MAP and PLOT modes is automatic. In the MAP, the GeoSCOUT uses the UTC Date string from the GPS as the filename with a 2 digit letter index extension. This file naming convention will allow a maximum of 626 files to be created per day. For example, a MAP filename may look as follows:

101205AA.csv

In the PLOT mode, the files are given the name "SITE" followed by a 4 digit numeric extension. This file naming convention will allow 10,000 plot files to be created and stored on the SD flash card. For example, a PLOT filename may look as follows:

SITE0000.CSV

2.5 Upgrading the GeoSCOUT Software

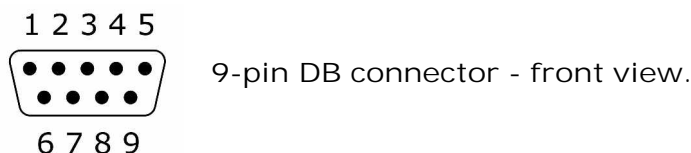
The GeoSCOUT's operating system (OS) can be upgraded in the field, quickly and simply. Updates can be downloaded from the Holland Scientific download page. To upgrade your GeoSCOUT's OS, please follow the following instructions:

- Step 1) Download GeoSCOUT OS upgrade from the Holland Scientific website www.hollandscientific.com/downloads.htm
- Step 2) Save the latest OS upgrade to the SD flash card.
- Step 3) Power up GeoSCOUT and insert SD flash card containing the OS update.
- Step 4) After navigating the start-up procedure outlined in Section 2.1, press the MENU button to enter the CONFIG mode.
- Step 5) Use the up/down buttons to navigate through the menu options until the display read "Update Geo OS"
- Step 6) Press the OK button and wait for the update process to initiate and complete. The update process will take approximately 1 minute to complete. When finished the GeoSCOUT will shut down. The GeoSCOUT OS is now updated

Appendix

A. Serial Port Pin-out Charts

The serial ports on the GeoSCOUT do not have standard RS-232 pin-outs. The pin lists for each port are given for users wishing to create their own custom cables. Please see tables below for details pertaining to the pin functions for the sensor and GPS/AUX serial ports.



Sensor Serial Port

Pin Number	Mode	Pin Description
1	I	Trigger Input
2	I	RS-232 Receive
3	O	RS-232 Transmit
4	PWR	Sensor Power (DTR)
5	PWR/GND	Signal Ground
6	-	Not Used (Reserved)
7	-	Not Used (Reserved)
8	I/O	RS-485 B Signal Pin
9	I/O	RS-485 A Signal Pin

GPS/AUX Serial Port

Pin Number	Mode	Pin Description
1	I	Auxiliary DSR Input (GLS420 Model Only)
2	I	RS-232 GPS Receive
3	O	RS-232 GPS Transmit
4	PWR	GPS Power (DTR)
5	PWR/GND	Signal Ground
6	I	RS-232 Auxiliary Receive (GLS-420 Model Only)
7	O	RS-232 Auxiliary Transmit (GLS-420 Model Only)
8	O	Auxiliary DTR Output (GLS-420 Model Only)
9	-	Not Used (Reserved)

B. Formatting SD Flash Cards

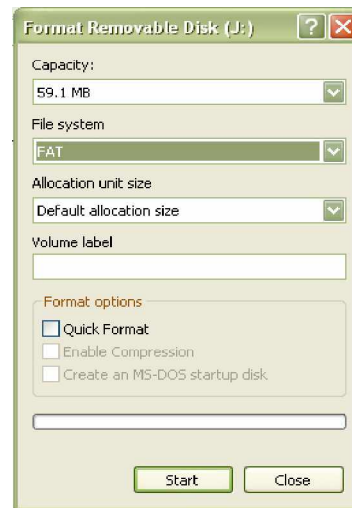
The file system utilized by the GeoSCOUT is DOS compatible, that is, files written by the GeoSCOUT to the SD flash card can be read by PCs running Microsoft Windows operating systems or other PC operating systems that can read DOS text files. Because the DOS file system supported by the GeoSCOUT is the FAT type (also referred to as FAT-16), SD flash cards should be formatted as FAT so as to be recognized by the GeoSCOUT. The procedure to do so is outlined below.

Step 1) Insert your SD flash card into a SD flash card reader connected to your computer. Note, if do not have a SD flash card reader, you will need to purchase one at your local electronics store.

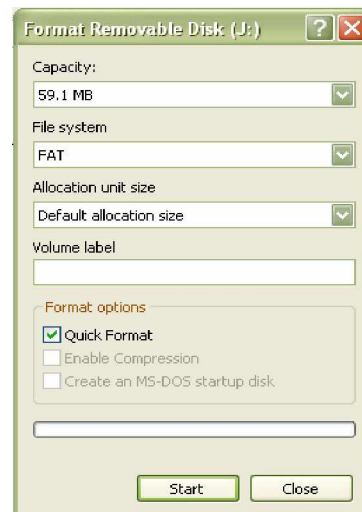
Step 2) Select the "My Computer" icon on the desktop screen. Click the icon to open it.

Step 3) Right click on the SD flash card icon and select the format option from the list.

Step 4) The format window is shown on the right. Click on the "File System" tab and select "FAT" as shown.



Step 5) Next check the "Quick Format" Box and then press start. MS Windows will then begin the formatting process and will prompt you when the process is complete. When complete, remove the card. The SD flash Card is now ready for use by the GeoSCOUT.



C. GeoSCOUT Care and Maintenance

Maintaining the GeoSCOUT datalogger is relatively easy and straight forward. Proper care and storage of the system will help ensure reliable and repeatable operation. Follow the recommendations below to properly care for your GeoSCOUT datalogger.

Before use: Inspect connectors prior to use. Clean to remove any dust or soil from interfering with connectors. Use a moist, soft cotton cloth to clean surfaces and enclosure. Never use an abrasive cleaner or rough cloth. Never use a solvent-based cleaner on the enclosure.

Storage: Between field surveys and after the seasonal usage, the GeoSCOUT should be stored at room temperature and in low humidity environment. Disconnect all cables and store GeoSCOUT in its storage case.

Cables: Check all cables before and after use. Look for damage to pins and wire sheaths. Note: bare or frayed wires can cause an electrical hazard that may present a danger to the user/by-stander and/or damage the instrumentation. If damage is noticed, contact Holland Scientific for repair or replacement of cable.

D. Notes