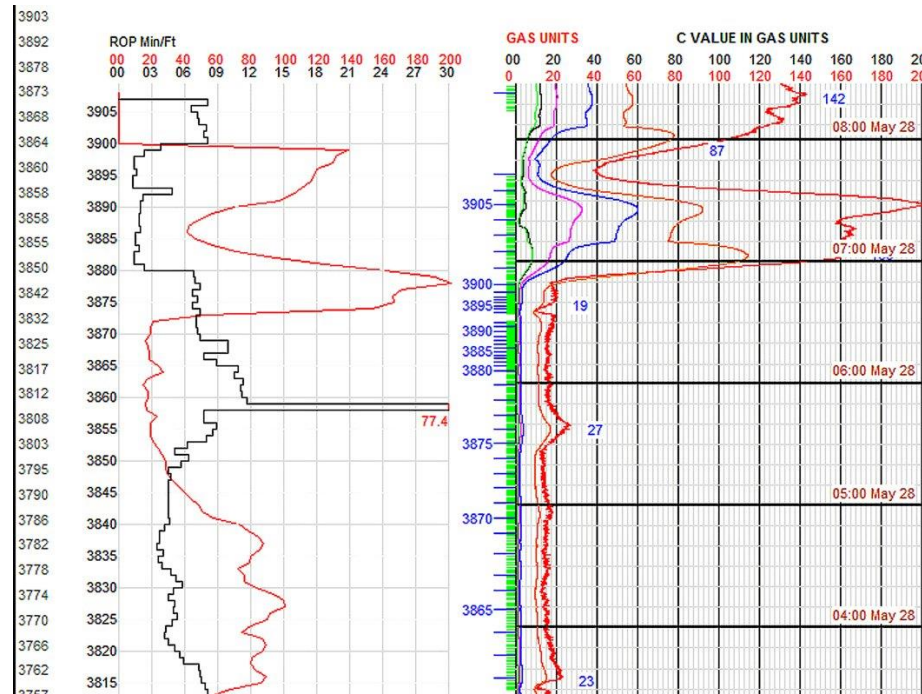




iBall Instruments Gas Chart Software User Manual

Software Release, Version 105



iBall Instruments Real Time Gas Detection Equipment
3540 National Drive
Norman OK 73069 USA
(405) 360-3300



24-HOUR TECHNICAL SUPPORT: (405) 570-4449.

1 CONTENTS

1	INTRODUCTION.....	7
1.1	HOW TO USE THIS MANUAL.....	7
1.2	OVERVIEW	9
2	GAS CHART SOFTWARE – QUICK START GUIDE	9
2.1	SYSTEM REQUIREMENTS/PREREQUISITES.....	10
2.2	APPLICATION DEFAULTS	11
2.3	INSTALLING GAS CHART SOFTWARE.....	12
2.4	CONNECTIONS	17
2.4.1	9-PIN SERIAL (DB9) CONNECTION (OPTION 1).....	17
2.4.2	USB CABLE CONNECTION (OPTION 2).....	18
2.4.3	LAN/ETHERNET CONNECTION (OPTION 3):	25
2.4.4	WAN/INTERNET CONNECTION (OPTION 4):	27
2.4.5	WITS CONNECTION	30
2.4.6	REINSTALLING GAS CHART	31
3	GAS CHART MAIN SCREEN.....	40
3.1	STATUS LINE	43
3.2	LEGEND.....	43
3.3	GAS OVER TIME CHART	44
3.3.1	GAS CHART TIME AND DATE	44
3.3.2	GAS UNITS LINE	44
3.3.3	CHROMATOGRAPH LINE.....	44
3.3.4	HYDROGEN SULFIDE (H ₂ S) LINE	45
3.3.5	BLUE DEPTH TICK MARKS	45
3.3.6	RED DEPTH TICK MARKS.....	46
3.4	DEPTH/ROP CHART	46

3.4.1	ROP LINE	46
3.4.2	AUTO ROP LINE	46
3.4.3	LAG GAS UNITS LINE	46
3.4.4	LAG GAMMA LINE	47
3.5	NAVIGATION – VERTICAL CHART SCROLLING	47
3.5.1	Large MOVEMENTS	47
3.5.2	FINE MOVEMENTS	47
3.5.3	CONTROL BOX ARROWS	48
4	Gas Chart Control Box	48
4.1	CONTROL BOX BUTTONS	49
5	Real-time data	52
5.1	PARAMETER DESCRIPTIONS	53
5.2	ANNOUNCEMENT WINDOW	57
5.3	CHART DATA BOX	58
5.4	TEXT CONTROLS	61
5.5	FILE NAME WINDOW	62
5.6	HYPER LINKS	62
6	Setup	63
6.1	ALARMS/AUDIO	63
6.2	AUTO ROP/LAG	65
6.2.1	GENERATE LAG USING PUMP STROKES METHOD:	66
6.2.2	GENERATE LAG USING TIME/DEPTH METHOD:	67
6.2.3	ZONES	68
6.2.4	GAMMA TOOL	69
6.2.5	SURFACE/LINE LAG	69
6.2.6	RECALCULATE LAG TIMES	70

6.3	LAS/XLS FILES.....	70
6.3.1	OUTPUT OPTIONS.....	72
6.3.2	DATA SEPARATION TYPES.....	73
6.3.3	AUTO GENERATION	74
6.3.4	C-VALUE OUTPUT TYPE AND GAIN.....	74
6.3.5	DEPTH RANGE	75
6.4	Charting.....	76
6.4.1	CHART ITEMS – TIME-BASED (RIGHT-SIDE).....	77
6.4.2	CHART ITEMS – DEPTH-BASED (LEFT SIDE).....	79
6.4.3	CHART DIAGNOSTIC ITEMS	80
6.4.4	CHART OIL INDICATOR	85
6.4.5	CHART WITS ITEM.....	86
6.4.6	MONITOR CUSTOM WITS ITEMS	87
6.4.7	CHROMATOGRAPH CHARTING MODIFIERS	87
6.4.8	CHART SCALES	88
6.5	Bloodhound.....	90
6.5.1	BLOODHOUND SETTINGS.....	91
6.5.2	SAMPLE GAS SENSOR HEALTH	93
6.5.3	SEND BLOODHOUND COMMAND.....	94
6.5.4	LOCAL ETHERNET OR INTERNET CONNECTION SETTINGS 94	
6.6	STATISTICS/TALLY	96
7	Select Items Box.....	97
7.1	VIEW CHROMATOGRAPH.....	97
7.1.1	PREVIOUS / NEXT BUTTONS	102
7.1.2	TIMING LINES BUTTON.....	102

7.1.3	SET C VALUE PEAK BUTTONS.....	103
7.1.4	PRINT BUTTON.....	103
7.1.5	VISIBLE GAIN SLIDER.....	103
7.1.6	ADJUST C VALUE % SLIDERS.....	104
7.2	DATABASE MARKING	104
7.3	GEOLOGRAPH SELECT DATA RESTORE.....	105
7.4	GEOLOGRAPH ALL DATA RESTORE.....	105
7.5	GEOLOGRAPH TICKS DELETE.....	105
7.6	DATABSE DATA ERASE	105
8	Geolograph Edit Box.....	106
8.1	ADD DEPTH TICK MARK.....	107
8.2	DELETE DEPTH TICK MARK	107
8.3	INSERT RENUMBERING STOP	108
8.4	REMOVE RENUMBERING STOP.....	108
8.5	RENUMBER GOING UP HOLE.....	108
8.6	RENUMBER GONG DOWN HOLE.....	108
8.7	RENUMBER STARTING AT	109
8.8	RENUMBER GEOLOGRAPH START.....	109
9	Appendix A – Glossary of Terms.....	110
10	Appendix B – Alarm Codes/Descriptions	111

1 INTRODUCTION

The iBall Instruments Gas Charting software enables the user to chart gas levels and other drilling data in real-time with high resolution and flexibility using the iBall Instruments Bloodhound system.

The Gas Charting software gathers information from the Bloodhound system, stores it in a Microsoft database, and displays gas levels, rate-of-penetration (ROP), and other data from the drilling operation. In addition, it can generate LAS and XLS text-based data files that can be utilized in logging software packages, such as those from Wellsight Systems. This functionality enables the user to produce well logs for their client or employer.







iBall Instruments distributes this software (and future upgrades) free of charge to all rental customers of the Bloodhound . Software can be downloaded from the iBall Instruments website at www.iballinst.com

1.1 HOW TO USE THIS MANUAL

This document is organized in a logical and hopefully meaningful fashion, first by section, then sub-sections. Each section covers a major section of the Gas Chart Software, or some meaningful function/aspect of using the software to monitor your gas output with the Bloodhound gas detector.

You will notice that there are occasional icons with short descriptions which appear on the left hand side of the pages in this document. Each icon has a different meaning, with the text supporting what is attempting to be conveyed. Below is a table of these icons and their meanings:

Table: Left-Margin Icons and their Meanings

Icon	Meaning
	NOTE: This is the most commonly-seen icon, and denotes some special piece of information that supplements the topic being covered.
	TIP: This denotes a special “hint or tip” that might be helpful in certain situations.
	LINK: This points out a helpful hyperlink which might be valuable for acquiring more information on the topic.
	CAUTION: This is used to point out any “gotchas” that might potentially be avoided in the current context.
	TRY ME: This denotes an experiment to try that might help in understanding the mechanism being described.
	ADVICE: This denotes expert advice that iBall personnel have discovered through years of operation and refinement of the Bloodhound system which would otherwise be learned via a hardship experience.

1.2 OVERVIEW



NOTE: A complete list of acronyms and their definitions can be found in Appendix A of this manual.

At first glance the software graphics appear to emulate a typical continuous chart recorder. However, the software package is a powerful and accurate application capable of generating highly accurate charts, LAS files and XLS files with details essential to the production of accurate mud logs.

The waterfall chart design was selected as it is the most familiar to the greatest number of mud loggers and geologists. The iBall Gas Chart software waterfall chart by default displays the newest data at the bottom of the chart and as time goes on the data move upward. (If desired, the user may choose to have newest data presented at the top of the page.)

The iBall Instruments Gas Chart software user interface consists of three Control Boxes and a few logical hot keys that control every function. Once the user masters the few buttons on the three Control Boxes and memorizes the “hot keys,” they are in complete control of the program.

A great deal of time has been spent working with today's mud loggers and geologists at various well sites to make this program as intuitive as possible. iBall Instruments is always looking for suggestions to improve the software and associated hardware devices. As suggestions are received from our users, improvements and refinements are integrated into the application and updates are made available at no cost to our customers.

2 GAS CHART SOFTWARE – QUICK START GUIDE

iBall Instruments Gas Charting software enables the gas levels and other drilling data in real-time with high resolution and flexibility using the iBall Instruments Bloodhound system.

This section provides step-by-step instructions on how to install, setup, and use the iBall Instruments Gas Chart software.

The software gathers information from the Bloodhound gas detection device and stores it in a database. The software also displays gas levels, rate-of-penetration (ROP), and other data from the drilling operation. In addition, it can generate and export LAS and XLS text-based data files that can be imported and used in logging software packages. This functionality enables the user to produce well logs for their client or employer.



ADVICE: Learning basic network terminology such as LAN/WAN, Topology, and having an understanding of network IP addressing and firewall operation is a benefit in advance rig-ups, and troubleshooting.



NOTE: Most firewalls are open to the Bloodhound and this is not a problem. If you have further questions about this, please contact technical support for additional documentation at support@iballinst.com.

2.1 SYSTEM REQUIREMENTS/PREREQUISITES

To install iBall Instruments Gas Charting software on your computer you will need to meet the following requirements:

- **OPERATING SYSTEM:** Microsoft Windows XP or later, 32-bit or 64-bit operating system, patched to most recent level using Microsoft Service Packs/Update function.
- **BROWSER:** Microsoft Internet Explorer 6.0 SP1 or later.
- **LOCAL CONNECTION OPTION (EITHER/OR):**
 - **USB:** One available USB port, and one USB Printer Cable (USB Type A to USB Type B).
 - **SERIAL:** One available 9-Pin Serial Port, and one 9-Pin Serial Cable, Male-to-Female.
- **FOR NETWORK CONNECTION OPTION:**
 - **LAN:** One Available Ethernet Port, and appropriate cabling to reach a network-address-issuing device (or router).
 - **WAN/INTERNET:** In addition to the LAN requirements above, this also requires a functional Internet connection with a firewall that allows the Bloodhound to communicate.

If you are unable to use a computer installed with Gas Chart directly connected to a Bloodhound (RUNNING LOCALLY see diagram below) as an alternative you can utilize iBall Instruments Remote Logging Webserver application (iBallremote) to collect drilling data from the onsite Bloodhound connected to the Internet, that will be sent to the iBall Data Center (RUNNING REMOTELY see diagram below). Remote

data collection will have slightly less functionality when using our webserver application.



TIP: iBall recommends storing ALL databases and LAS/XLS export files in the default C:\DB_CUE directory and to create a desktop shortcut to that folder.



2.2 APPLICATION DEFAULTS

The iBall Gas Charting software installation will create 2 default directories as listed below:

- Program Directory = iBall located in C:\Program Files\iball
- Application Working Directory = DB_CUE located in C:\DB_CUE



CAUTION: When viewing or editing the database using newer versions of Microsoft Access, it is important to save it under the JET 4,0 database structure, otherwise the database will no longer be compatible with the Gas Chart software program.

The program directory stores all necessary application files and the working directory stores all data collected and exported. Proper Directory/Folder/File permissions are required for both default directory locations to ensure accurate application operations.

When installing Gas Chart for the first time, the installation package will install and open a demo database. The data collected is stored in a Microsoft database structure using the Microsoft 4.0 JET database engine format. All databases generated by this application end with a file extension of *.MDB, and are created without encryption, and use no proprietary data formats.

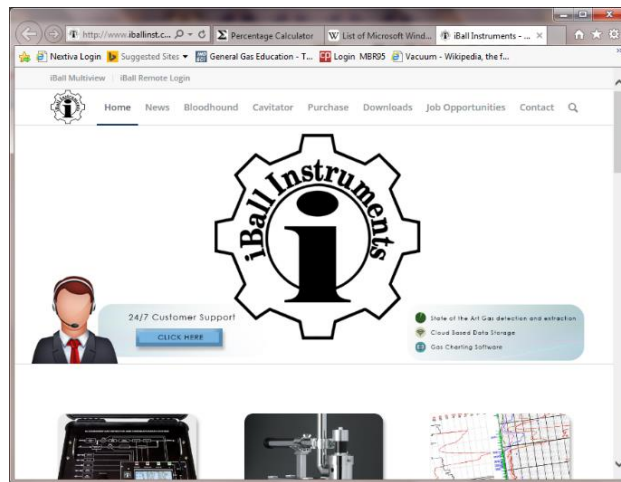
Therefore the user is able to examine, use, and modify the data with simple Microsoft tools such as Microsoft Access.

2.3 INSTALLING GAS CHART SOFTWARE

Your Bloodhound device will not ship with the media for the Gas Charting software or device drivers. In order to download the latest release, you will need to go to the iBall Instruments website.

Steps to Install:

- 1) **Open your Internet Browser and in the address bar TYPE in <http://www.iballinst.com> and press enter to reach the following web page:**



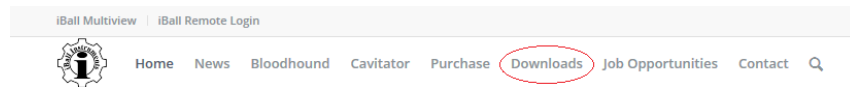


NOTE: It is good practice to check the iBall Instruments website before each well to be sure you have the latest release on your computer. Many issues can be avoided by doing so (see Section below - Upgrading Gas Chart - if you need to upgrade to the latest version).

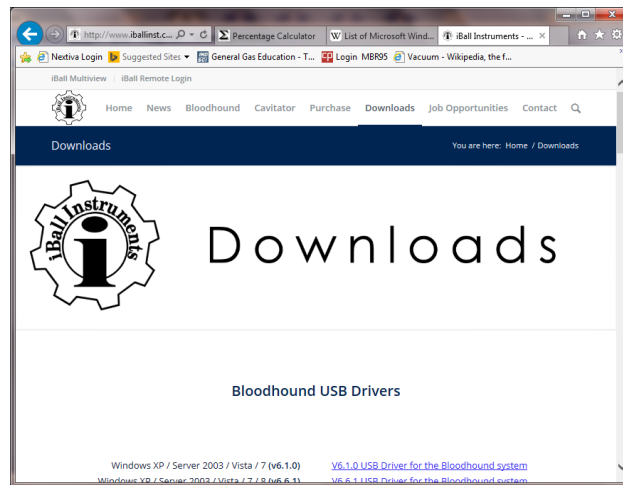


LINK: For a list of all available downloads including Gas Chart, other software, drivers, and updated manuals go to:
<http://iballinst.com/downloads>

- 2) At the top of the Browser page you will see a menu bar. **CLICK** to select the Downloads menu option (circled in the picture below).



You will now be presented with the following web page:



When you scroll down on the Downloads webpage you will see several options to download. For this exercise we are only going to download the latest Gas Chart software package.

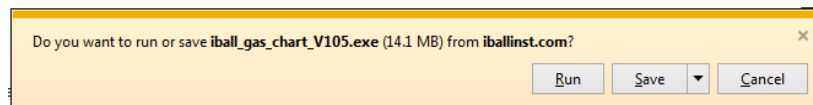
- 3) Scroll down to the section “Gas Charting Software” and **CLICK** the hyperlink for iBall Instruments Gas Charting - Software Download Version XXX (as circled in picture below). Where XXX is will be the latest version. This is subject to change at anytime:

Gas Charting Software

Get to know the easiest and best way to monitor the data directly from the iBall Instruments gas detection system by downloading and installing the actual program used to do all real time gas charting. A demonstration data base included in the install so you can get familiar with the program before you even set foot into the trailer. The program is written in VB6 and is backward compatible to Microsoft Windows 98 and tested on all Microsoft windows products, including Microsoft Vista and Windows 8.

[iBall Instruments gas charting – software Download Version 105](#)
[iBall Instruments gas charting – users manual \(PDF\)](#)

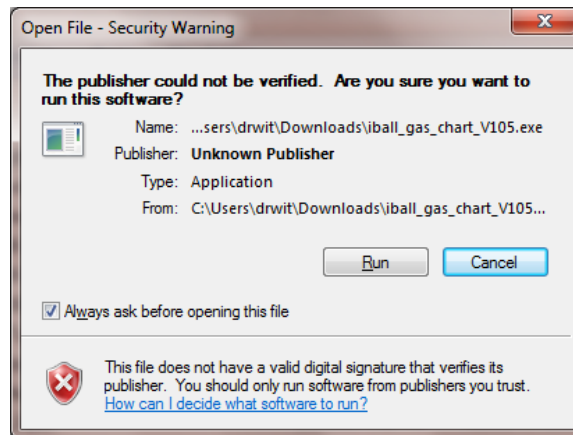
This will start the Download process from the iBall webserver to your local computer. Depending on your Operating System version you should see a pop-up at the bottom of your Browser window showing you that the download process has started and asking if you would like to Run or Save the download to your computer (as pictured below):



- 4) **CLICK Save to start the download. You should be able to view the download progress, and it should also show you the download location (make a note of the location).**
- 5) **When download is complete, locate the download directory (Downloads folder is usually the default directory or the directory noted above)**
- 6) **Once you are in the download directory you are ready to run the installation. DOUBLE-CLICK the executable file named iBall_gas_chart_Vxxx.exe (where xxx will be the latest software release number). A program installer window will open as pictured below:**

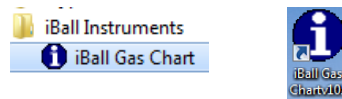


NOTE: *It is recommended that you Save the download at this point so the file will be available if problems with the install occur, or if you need it at a later point for other reasons.*

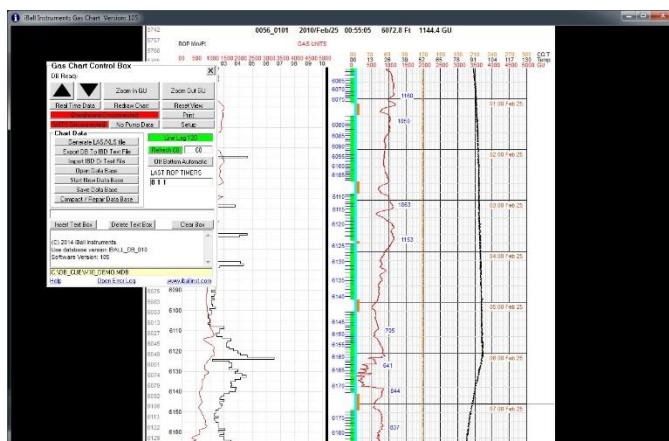


- 7) **CLICK Run.** The program will start installing, copying, updating, and configuring all required files to your computer. Once complete the program should have been successfully installed.

You will now have a new Program on your All Programs Menu and a new program icon on your Desktop that look like this:



- 8) **DOUBLE-CLICK** the desktop icon to launch the Gas Chart software, and wait for it to load. Gas Chart will launch with a black background and begin gathering the ROP data and refreshing the database. After waiting for this process to complete, you will be presented with Gas Chart's main screen (see figure below).



- 9) After Gas Chart loads, verify that it is indeed the version you just installed by looking in the upper-left-hand corner of the application, on the title bar. You will see the text “iBall Instruments Gas Chart Version XXX” where “XXX” is the version of the software you are running (see figure below for an example).



NOTE: The size of the database in Gas Chart will directly relate to the amount of time it takes to gather ROP and load the database. A larger database will take longer than a smaller one.



At first launch the Gas Chart software loads a simulated database that is available to demonstrate the operation of the software. After that point you will be presented with the main Gas Chart screen, similar to that of the image above. To verify this, note that the title of the database (located in the yellow data field at the bottom of the “Gas Chart Control Box” ends in “V10_DEMO.MDB”. This is a real data set from a past well, and displays an example of the overall charting function the program. This is not a live/running database, but is static and will not change over time. When Gas Chart is connected to a Bloodhound in the field, the chart will be continually advancing in two-minute intervals.

At this point your PC is installed with the Gas charting software and ready to collect data from the Bloodhound device **AFTER** the Bloodhound is successfully connected to your local PC. Connection requirements are discussed in the next section.

2.4 CONNECTIONS

The Gas Chart software has full functionality when the computer it is running on is directly connected to a Bloodhound by way of 3 options (1 thru 3):

- 1) USB cable connection**
- 2) Local-Area-Network (LAN)/Ethernet connection**
- 3) Wide-Area-Network (WAN)/Internet**
- 4) WITS Connection (this connection option is discussed below but is only needed when connecting to a WITS provider).**

Each connection option is configured on the Bloodhound tab in Setup and is described individually as follows:

2.4.1 9-PIN SERIAL (DB9) CONNECTION (OPTION 1)

This connection option involves connecting a 9-pin serial Male-To-Female cable between your PC and the Bloodhound's Serial Port, which is the bottom of the two 9-pin ports on the Bloodhound. This method does not require drivers other than those native to the hardware serial port on your computer. A 9-pin Mail-to-Female Serial cable is pictured below for reference:



2.4.2 USB CABLE CONNECTION (OPTION 2)

The USB cable connection is the most common connection method. To locally connect the PC running Gas Chart to the Bloodhound you will use the USB-A to USB-B (printer) cable that is shipped with each unit and can be found in the black pouch when you open the Bloodhound case (pictured below):



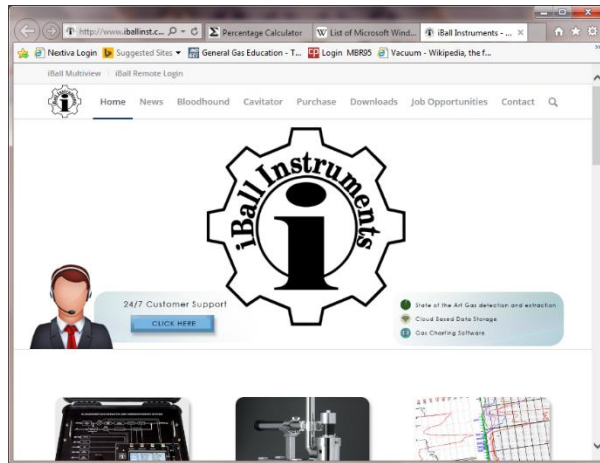
NOTE: You will first need to download and install the USB Bloodhound device drivers before connecting the cable to the Bloodhound and testing for connectivity.



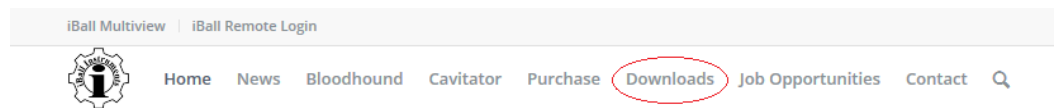
Installing the USB drivers:

- 1) Open your Internet Browser and in the address bar TYPE in <http://www.iballinst.com> and press enter.

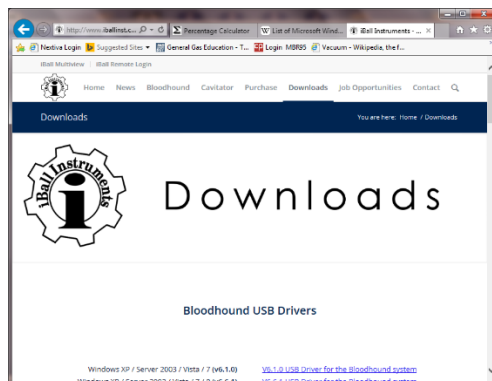
Your Browser should look like this:



- 2) Up at the top of the Browser page you will see a menu bar. **CLICK** to select the **Downloads** menu option (circled in the picture below).



Your Browser should look like this:



When you scroll down on the Downloads webpage you will see several options to download. For this exercise we are only going to download the v6.7 USB Drivers.

- 3) Scroll down to the section “Bloodhound USB Drivers” and CLICK the hyperlink for the Device Driver you require based on your computers current operating system.

Bloodhound USB Drivers

Windows XP / Server 2003 / Vista / 7 / 8 / 8.1 (v6.7)

Windows 10 Driver (V6.7.1)

Bloodhound SB72 card setup program

[V6.7 USB Driver for the Bloodhound system](#)

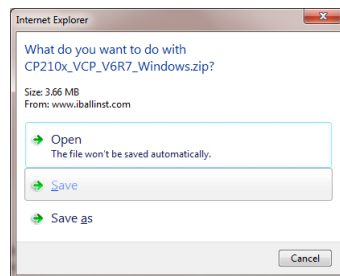
[V6.7.1 Windows 10 USB Driver for the Bloodhound system](#)

[IP Setup for SB72 Cards](#)



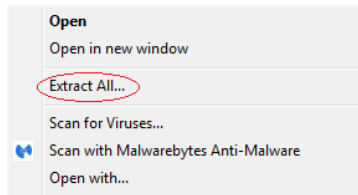
TIP: It is recommended that you Save the download at this point so it is available at a later time without having to re-download it. This is useful in the case that you need to install another copy of the software, or reinstall on the existing computer.

This will start the Download process from the iBall webserver to your local computer. Depending on your Operating System version you should see a pop-up on your screen or at the bottom of your Browser window showing you that the download process has started and asking if you would like to Run or Save the download to your computer, for this exercise we will use the driver package v6.7 (as pictured below):

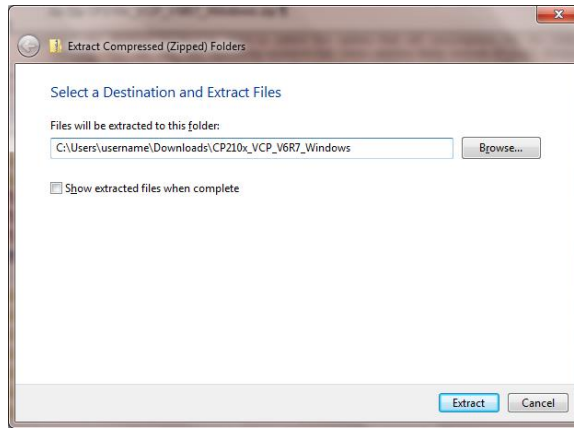


- 4) CLICK Save to start the download. You should be able to view the download progress, and it should also show you the download location (If you selected Save As make a note of the location).

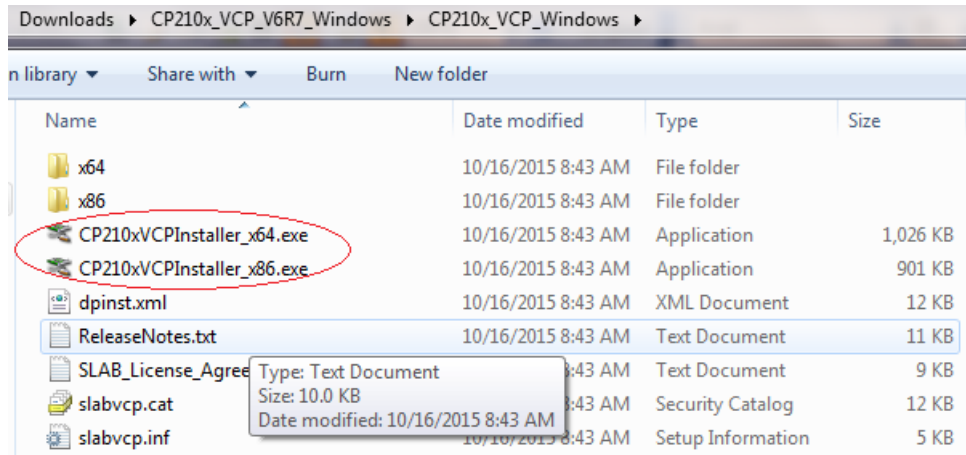
- 5) When download is complete, locate the download directory (Downloads folder is usually the default directory or the directory noted above))
- 6) Once you are in the download directory you first need to uncompress (i.e. Extract or Unzip) the files in the driver folder before you can run the installation successfully. Right-Mouse CLICK the zip file CP210x_VCP_V6R7_Windows.zip.
- 7) From the shortcut menu you need to select the option that will uncompress the file folder contents. This can vary with operating systems but menu options likely include (Extract, Extract All, UnZip, 7Zip, etc.). For this exercise we will select Extract All (as pictured below):



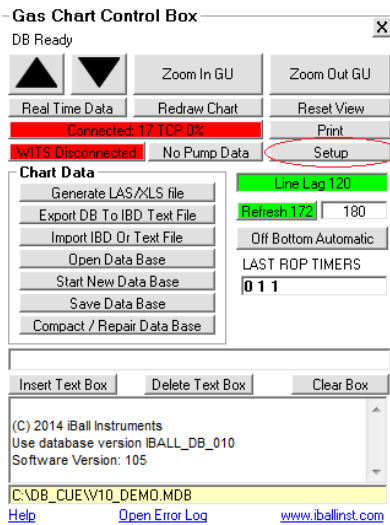
- 8) You can keep the default location to uncompress files to or Browse to change the directory. Once complete CLICK Extract button to complete the uncompressing procedure (as pictured below):



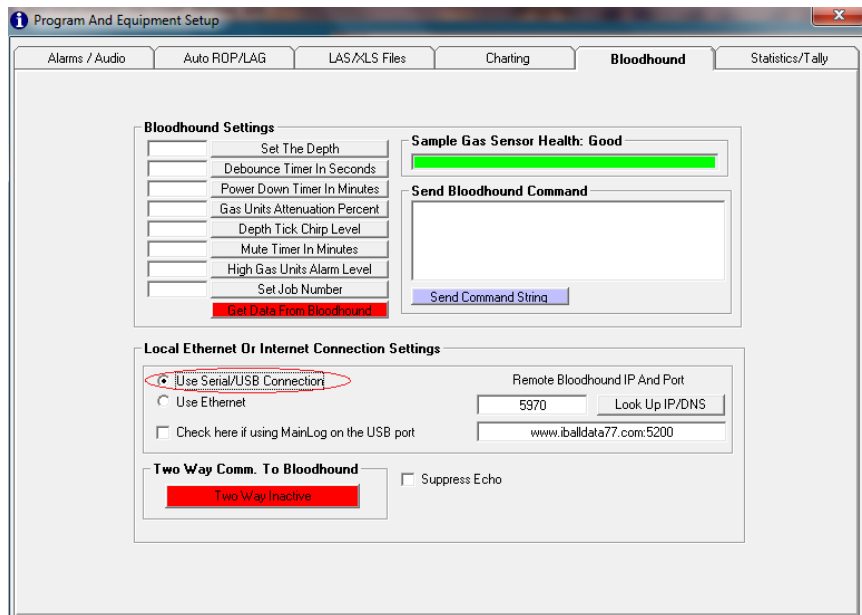
- 9) You should now have a new folder with the same name in the directory you chose in the step above without the .ZIP extension on it. **DOUBLE CLICK** the new uncompressed folder to drill down in the folder directories for the installer executable. You have 2 options to choose from depending on your operating system (64 bit and 32 bit). Most operating systems these days are 64 bit so you can try that one first. If you get an error stating that your OS is not 64 bit, or that the install is not compatible with your computer, then you can simply abandon that install and select the 32 bit install (which is the x86 exe). The picture below show the 2 installer files you will choose from and their directory locations:



- 10) Once the install is complete for the Driver package, plug in the USB cable from the Bloodhound to your computer. Your PC's operating system will complete the Device Driver installation.
- 11) Open Gas Chart. Wait for database ROP gathering to complete.
- 12) Click the Setup button from the Gas Chart Control Box (as pictured below):



13) Click to select the Bloodhound tab and make sure the Use Serial/USB Connection radio button option is selected (as pictured below):



- 14) Click the Red X to close the Setup window. Verify in the Control Box that the Bloodhound is Green and connected. If yes you are done!

2.4.3 LAN/ETHERNET CONNECTION (OPTION 3):

The Ethernet connection is available to those logging operations that have a Local Area Network configured on location (Rig Network) that can be utilized for Internet connectivity. The Ethernet connection steps below apply to all Bloodhound models.

To locally connect the PC running Gas Chart to the Bloodhound using the Bloodhound's Ethernet port, you will first need an Ethernet CAT5 cable. This type of cable is not provided with the Bloodhound rental. The Ethernet cable can be any length and will have an RG45 connector on each end (as pictured below):



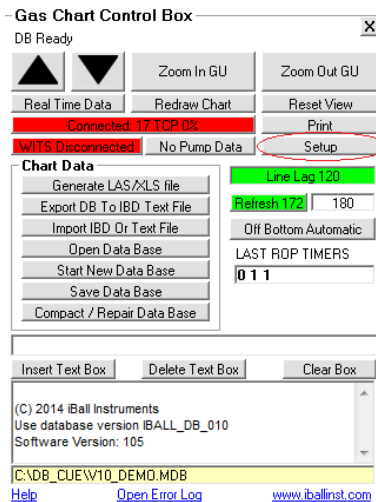
***TIP:** Please refer to the Bloodhound User Manual for more information on the hardware configuration required for Internet connectivity for each Bloodhound model.*



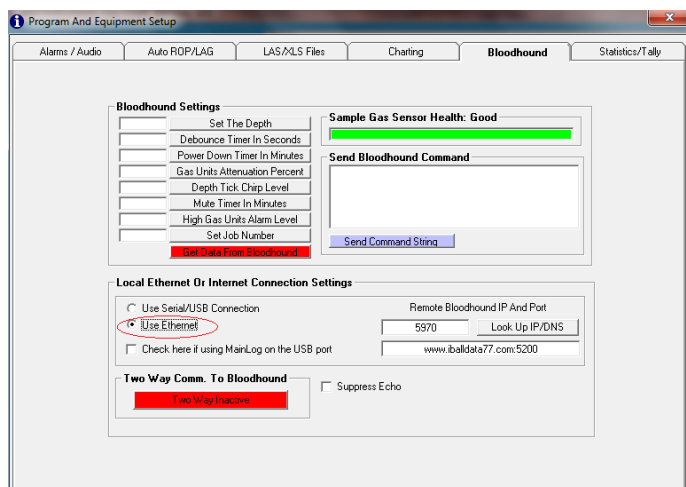
- 1) Plug in one end of the Ethernet cable to the side of the Bloodhound, and the other to an available LAN port (either your Rig router/modem or network provided switch).
- 2) Wait for a few seconds for the Bloodhound to find and connect to the LAN. Once connected the Bloodhound will display an IP Address from the LAN on the faceplate display. Wait for the data at the bottom of the display to scroll around and write down the IP Address and port

information exactly as shown (ex. 192.168.1.10:23 / or 10.16.1.2:23 / or 172.123.13.1:23 or something similar).

- 3) Open Gas Chart. Wait for database ROP gathering to complete.
- 4) Click the Setup button from the Gas Chart Control Box (as pictured below):



- 5) Click to select the Bloodhound tab and make sure the Use Ethernet Connection radio button option is selected (as pictured below):

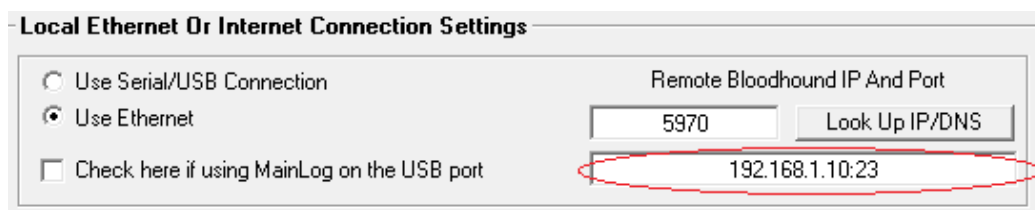


- 6) In the Edit box to the right of the Use Ethernet radio option you just selected, you need to type in the LAN IP Address and Port you collected in Step # 2 above. Delete the DNS Name and Port currently in that Edit Box (i.e. www.iballdata77.com:5300) and then type in your LAN IP/Port.



NOTE: For the LAN connection option, ignore the smaller Edit box to the Left of the button labeled, "Look Up IP/DNS".

EXAMPLE: Using one of the sample IP Addresses from Step # 2 your screen should look like the picture below:



- 7) Click the Red X to close the Setup window. Verify in the Control Box that the Bloodhound is Green and connected. If yes you are done!

2.4.4 WAN/INTERNET CONNECTION (OPTION 4):

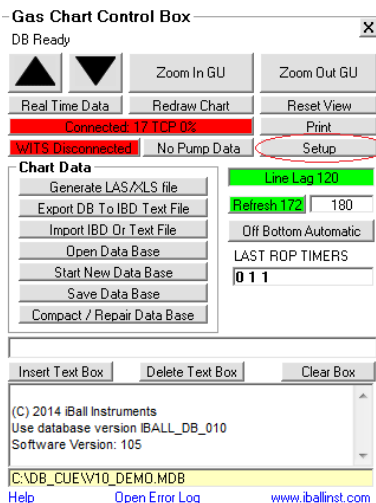


TIP: Please refer to the Bloodhound User Manual for more information on the hardware configuration required for Internet connectivity for each Bloodhound model.

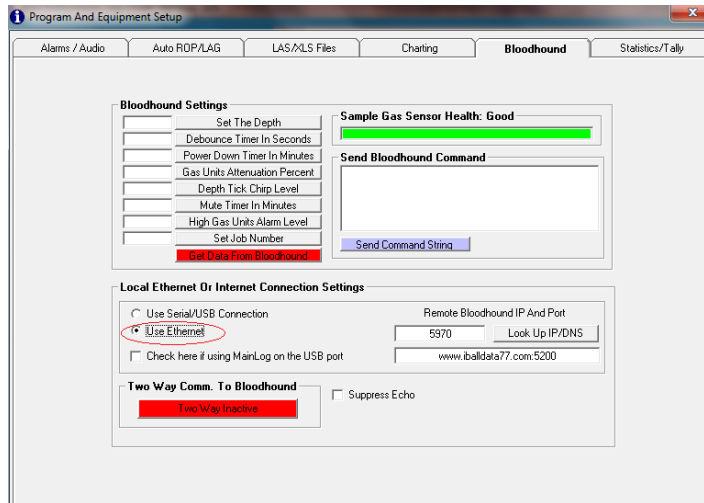
This Ethernet connection is a connection option if you cannot connect the Bloodhound and the PC using the USB cable AND you do not have a LAN to connect to. This method will only work if the internal Modem in the Bloodhound is powered on, has an active SIM card installed, and is connected to the Internet.

In this scenario you will not need an Ethernet cable. You will want to be sure the Bloodhound is connected to the Internet and broadcasting its data.

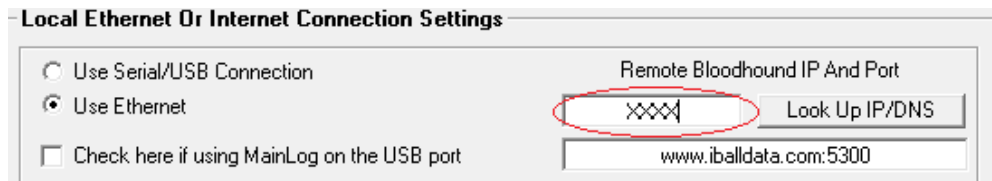
- 1) After completing the steps to get the Bloodhound connected to the Internet using the internal modem (see NOTE above), open Gas Chart. Wait for database ROP gathering to complete
- 2) Click the Setup button from the Gas Chart Control Box (as pictured below):



- 3) Click to select the Bloodhound tab and make sure the Use Ethernet Connection radio button option is selected (as pictured below):



- 4) In the Edit box to the right of the Use Ethernet radio option you just selected, you will ONLY be concerned with the smaller Edit box to the Left of the Look Up IP/DNS button. Remove the unit number that is in that box and type in the Unit number of the Bloodhound you are using. Where XXXX is in the picture below is where you will type in your BH Unit number:



- 5) Once your Bloodhound unit number is entered, **CLICK** the Look Up IP/DNS button to the right of that Edit box.
- 6) Click the Red X to close the Setup window. Verify in the Control Box that the Bloodhound is Green and connected. If yes you are done!

2.4.5 WITS CONNECTION

The Bloodhound is designed to automatically establish communications to an Electronic Drilling Recorder (EDR) to collect and monitor WITS data that is available during the drilling process. In the collection process the Bloodhound builds a WITS packet that will be sent to the host server. There is no external hardware required to make this connection. The Bloodhound has incorporated connection interfaces to communicate (please refer to the Bloodhound User's Manual for detail on each interface).

If your operations require Gas Chart to receive input from a WITS workstation, you will need to be sure of the following in order for the Gas Chart software to collect the WITS data.



NOTE: The Bloodhound's faceplate display should show "WITS GOOD" in the "rotating" data field in the bottom-right corner if your cable and WITS configuration is functional. Otherwise, it will show "NO WITS" or "WITS BAD".

- 1) Ensure that the Bloodhound and the WITS workstation are physically connected to each other via the RS232 WITS connection interface or the RS422 (Pason compatibility only, please see APPENDIX E) connection interface. The Bloodhound's connections are described in detail in the Bloodhound Users Manual. The RS232 interface is most commonly requires a Null Modem Serial Cable (DB9 Female to Female) as pictured below:



NOTE: Gas Chart does not require any software configuration for a WITS connection. If the Bloodhound and the EDR are communicating, and the computer running Gas Chart is successfully connected to the Bloodhound, WITS will show connected in the application.

- 2) Setup the WITS Out configuration on the Electronic Drilling Recorder (EDR) for all the data types you need, and be sure to save the configuration.
- 3) Launch the Gas Chart software if it is closed, and confirm in the Gas Chart control box that the WITS Connection button shows Green and Connected. This button acts as a toggle for the WITS connection depending on its connection state.

2.4.6 REINSTALLING GAS CHART

iBall Instruments is dedicated to keeping our products Enhanced to better accommodate the needs of our customers. Field operations are constantly demanding program additions, deletions, and modifications which we respond to as needed. We are also enhancing our products as our customers bring valuable and practical program "wish-list" items to our attention. Be sure to check our website for the latest Gas Chart revisions to stay up to date.

You have 2 options to upgrade your current version:

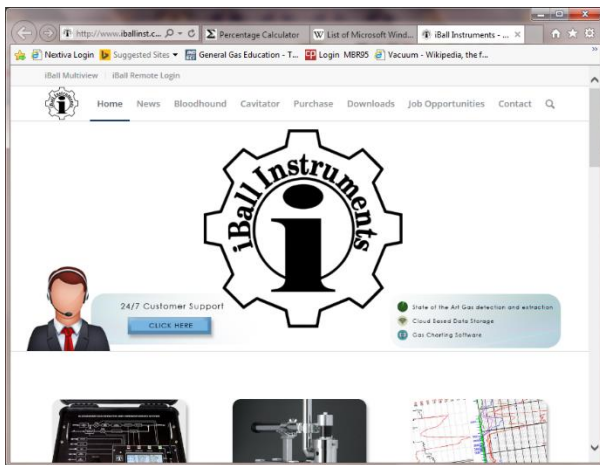
- 1) **REPLACE** - Install a new version over the top of an old version.
 - 2) **CLEAN** - Install a new version after removing an old version.
- Option 1 (REPLACE) will copy over all program files with the latest versions within the same directory structure. This is quick and usually a viable option for most. Option 2 (CLEAN) is often required for those PCs that present system issues. Option 2 requires a few more steps but is recommended if you have been having problems.

The steps for both options are as follows:

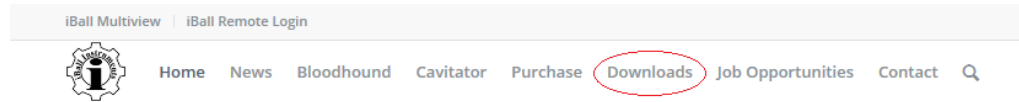
2.4.6.1 REPLACE (OPTION 1)

- 1) Close the current version of Gas Chart.
- 2) Download the latest software version of Gas Chart from the iBall website. Open your Internet Browser and in the address bar TYPE in <http://www.iballinst.com> and press enter.

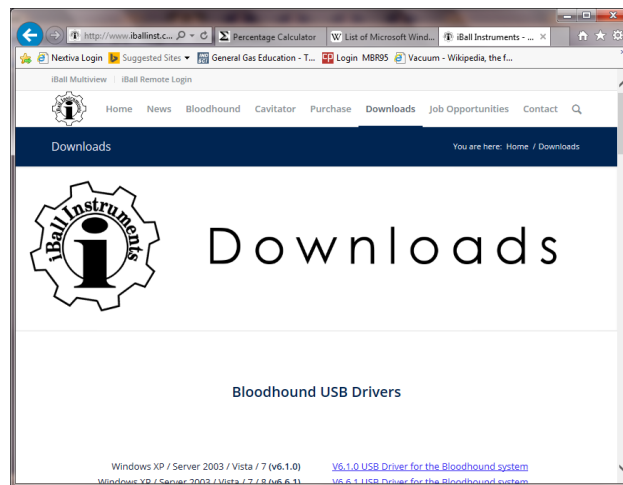
Your Browser should look like this:



- 3) Up at the top of the Browser page you will see a menu bar. **CLICK** to select the Downloads menu option (circled in the picture below).



Your Browser should look like this:



When you scroll down on the Downloads webpage you will see several options to download. For this exercise we are only going to download the latest Gas Chart software package.

- 4) Scroll down to the section “Gas Charting Software” and **CLICK** the hyperlink for iBall Instruments Gas Charting - Software Download Version XXX (as circled in picture below). Where XXX is will be the latest version. This is subject to change at anytime:

Gas Charting Software

Get to know the easiest and best way to monitor the data directly from the iBall Instruments gas detection system by downloading and installing the actual program used to do all real time gas charting. A demonstration data base included in the install so you can get familiar with the program before you even set foot into the trailer. The program is written in VB6 and is backward compatible to Microsoft Windows 98 and tested on all Microsoft windows products, including Microsoft Vista and Windows 8.

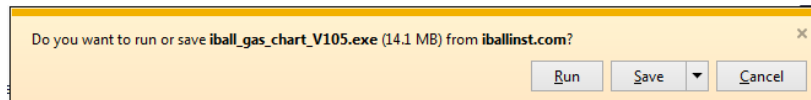
[iBall Instruments gas charting – software Download Version 105](#)

[iBall Instruments gas charting – users manual \(PDF\)](#)

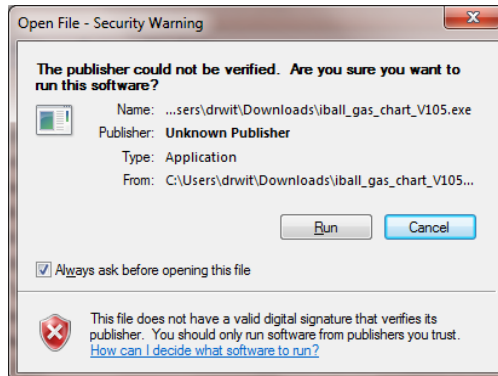


TIP: It is recommended that you save this download to a location where you can access it later so it is available should you need it for another installation.

This will start the Download process from the iBall webserver to your local computer. Depending on your Operating System version you should see a pop-up at the bottom of your Browser window showing you that the download process has started and asking if you would like to Run or Save the download to your computer (as pictured below):



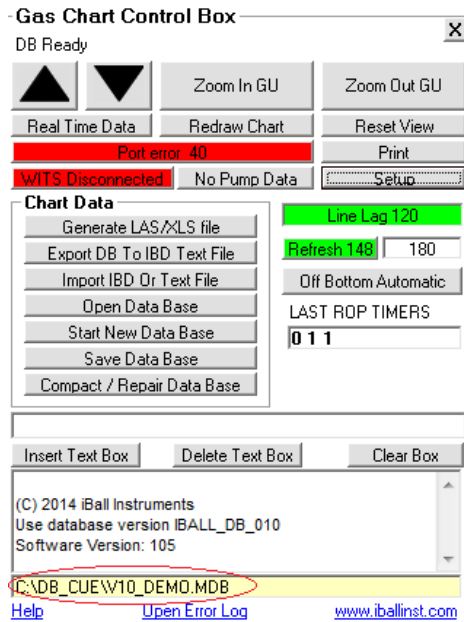
- 5) **CLICK Save to start the download.** You should be able to view the download progress, and it should also show you the download location (make a note of the location).
- 6) When download is complete, locate the download directory (Downloads folder is usually the default directory or the directory noted above)
- 7) Once you are in the download directory you are ready to run the installation. **DOUBLE-CLICK** the executable file named iBall_gas_chart_Vxxx.exe (where xxx will be the latest software release number you just downloaded, **BE SURE IT IS THE LATEST**). A program installer window will open as pictured below:



- 8) **CLICK Run.** The program will start installing, copying, updating, and configuring all required files to your computer. Once complete the program should have been successfully upgraded.

Congratulations! You now have the updated Gas Chart program on your All Programs Menu and an updated program icon on your Desktop.

- 9) **DOUBLE-CLICK** to launch the Gas Chart software.
- 10) **Verify that the program is displaying the latest version.** You can verify the version number in the top left corner of the application window, or in the Notes section of the Control Box. If it matches the version you just downloaded, the upgrade was successful.
- 11) **Verify that your database reopened in the updated version but referring to the path and file name at the bottom of the Control Box (as circled in the picture below):**



12) Verify that Bloodhound and WITS (if applicable) are connected.

2.4.6.2 CLEAN (OPTION 2)

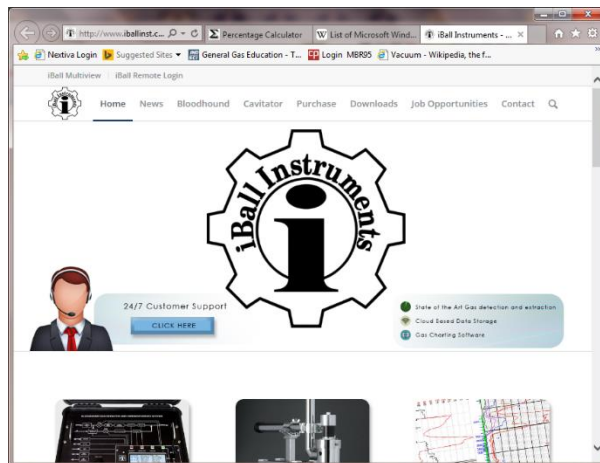
To upgrade using the CLEAN option you will be removing the iBall Instruments Gas Chart software program from your computer, rebooting you computer, then downloading and installing the latest version to complete the upgrade.

The steps for this option are as follows:

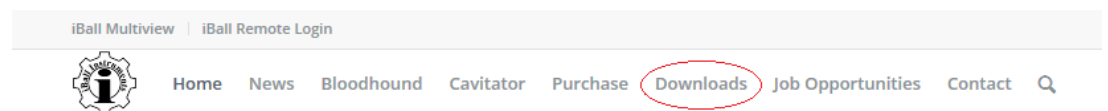
- 1) Close the current version of Gas Chart.
- 2) Go to your Programs utility for your Operating System version and select Add/Remove Programs, or Programs and Features (each OS may present the utility differently).

- 3) Find the iBall Instruments Gas Chart program in the program list and **CLICK** to select it.
- 4) At the top of the program list **CLICK** the Uninstall/Change button to start the removal process.
- 5) Reboot the computer. Be sure to close all open applications and save all files **BEFORE** allowing the reboot.
- 6) Once the PC is back up after the reboot process, you need to download the latest software version of Gas Chart from the iBall website. Open your Internet Browser and in the address bar **TYPE** in <http://www.iballinst.com> and press enter.

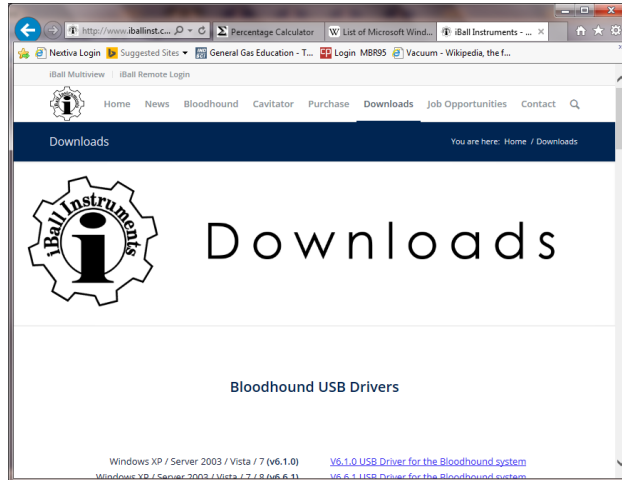
Your Browser should look like this:



- 7) Up at the top of the Browser page you will see a menu bar. **CLICK** to select the Downloads menu option (circled in the picture below).



Your Browser should look like this:



When you scroll down on the Downloads webpage you will see several options to download. For this exercise we are only going to download the latest Gas Chart software package.

- 8) Scroll down to the section “Gas Charting Software” and CLICK the hyperlink for iBall Instruments Gas Charting - Software Download Version XXX (as circled in picture below). Where XXX is will be the latest version. This is subject to change at anytime:**

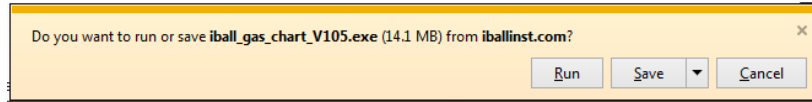
Gas Charting Software

Get to know the easiest and best way to monitor the data directly from the iBall Instruments gas detection system by downloading and installing the actual program used to do all real time gas charting. A demonstration data base included in the install so you can get familiar with the program before you even set foot into the trailer. The program is written in VB6 and is backward compatible to Microsoft Windows 98 and tested on all Microsoft windows products, including Microsoft Vista and Windows 8.

[iBall Instruments gas charting – software Download Version 105](#)
[iBall Instruments gas charting – users manual \(PDF\)](#)

This will start the Download process from the iBall webserver to your local computer. Depending on your Operating System version you should see a

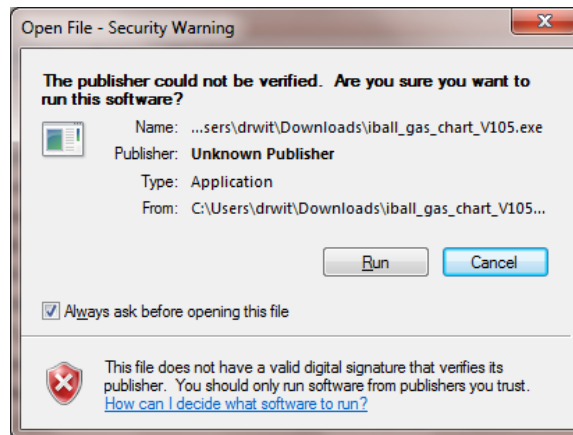
pop-up at the bottom of your Browser window showing you that the download process has started and asking if you would like to Run or Save the download to your computer (as pictured on the next page):



- 9) **CLICK Save to start the download.** You should be able to view the download progress, and it should also show you the download location (make a note of the location).
- 10) When download is complete, locate the download directory (Downloads folder is usually the default directory or the directory noted above)
- 11) Once you are in the download directory you are ready to run the installation. **DOUBLE-CLICK** the executable file named **iBall_gas_chart_Vxxx.exe** (where xxx will be the latest software release number you just downloaded, **BE SURE IT IS THE LATEST**). A program installer window will open as pictured on the next page.



TIP: iBall
Recommends saving the download rather than running so that it is available for later use should the need arise.



12) CLICK Run. The program will start installing, copying, updating, and configuring all required files to your computer. Once complete the program should have been successfully upgraded.

Congratulations! You now have the updated Gas Chart program on your All Programs Menu and an updated program icon on your Desktop.

13) DOUBLE-CLICK to launch the Gas Chart software.

14) Verify that the program is displaying the latest version. You can verify the version number in the top left corner of the application window, or in the Notes section of the Control Box. If it matches the version you just downloaded, the upgrade was successful.

15) CLICK the Open Data Base button from the Control Box to view the contents of the default Working directory (C:\DB_CUE) and **DOUBLE-CLICK** to open your current database.

16) After the programs gathers ROP for your desired database, verify the Working directory and database name at the bottom of the Control Box.

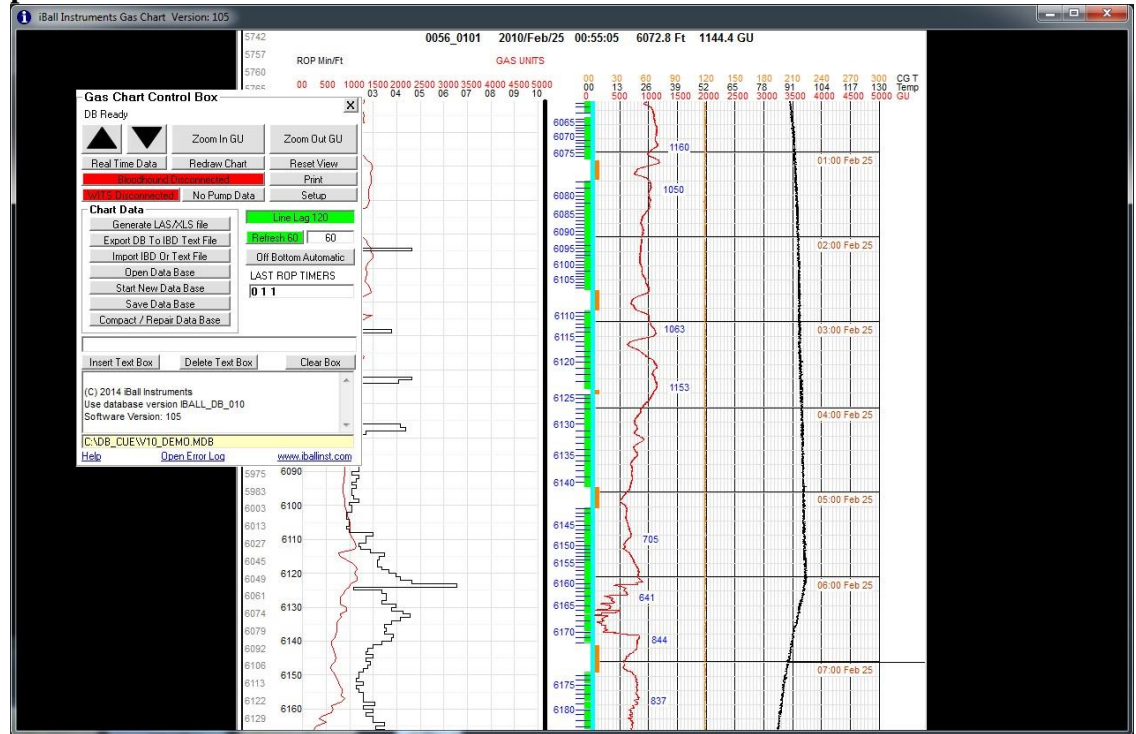
17) Verify that Bloodhound and WITS (if applicable) are connected.

3 GAS CHART MAIN SCREEN

When the Gas Chart program is started, it first makes several database checks to ensure that the database is in the correct structure and has all the correct points. During this database check, a window will open up to display the status of the database check and alert the user if there are any problems. After these database checks are completed, the program will generate the Data Logger Main Screen and draw a uniform grid.

The Main Screen is a white box that will automatically resize to the top and bottom of the monitor screen size. A minimum screen resolution of 1024 x

768 is suggested when using this program. A lower resolution is usable but not recommended. Once the loading process completes, you will be presented with the main screen to Gas Chart. It should look similar to this:



The Main Screen is a large chart divided in half by a thick black line at the center of the page. To the left and right of this line are actually two entirely different charts that are drawn in two different ways. The chart on the left is drawn by depth and will advance only when depth is being recorded. The chart on the right is drawn by time, and will advance whether depth is advancing or not.

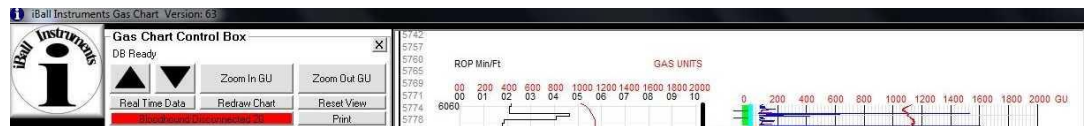
ON THE LEFT: By default, the left hand chart displays the rate of penetration (ROP) as a black “stepped” line, as well as the total gas as a red line.



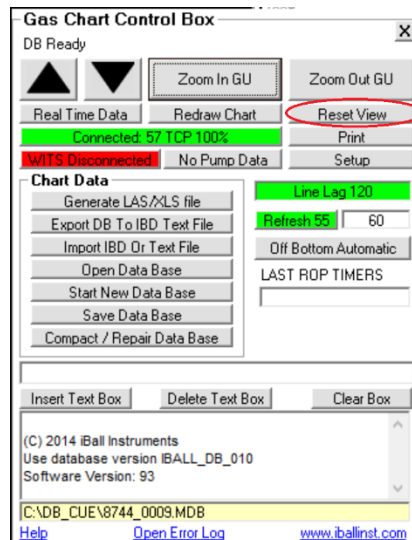
NOTE: Options for charting are defined in “Program and Equipment Setup” within the “Setup” screen. This is covered later in the document.

ON THE RIGHT: The right hand chart displays gas units over time as well as a variety of other optional items.

You can think of the left hand chart as being by footage while the right hand chart is by time. The two charts will have equal horizontal scales for similar items that are plotted on both of them, such as gas units on the right and lagged gas units on the left.



Although new data comes into the software's database every 6 seconds, the Main Screen is not automatically updated that frequently. This reduces the problem of the charts shifting while the user is trying to do something, such as make a depth correction. To manually refresh the charts with the most recently received data, the user may click on the Reset View button in the Chart Control Box (shown below):



3.1 STATUS LINE



NOTE: The data displayed on the Status Line is not the “current” real-time data, but rather is a snapshot in time of the data that arrived at the time denoted by the position of the cursor/arrow.

Whenever you move or place your cursor in the chart with the mouse (the arrow), you will see an update to Gas Chart's Status Line. This is a bold, black text line at the top of the actual chart which has a white background (see image below).

0056_0101 2010/Feb/25 04:32:48 6134.7 Ft 813.1 GU
ROP Min/Ft GAS UNITS

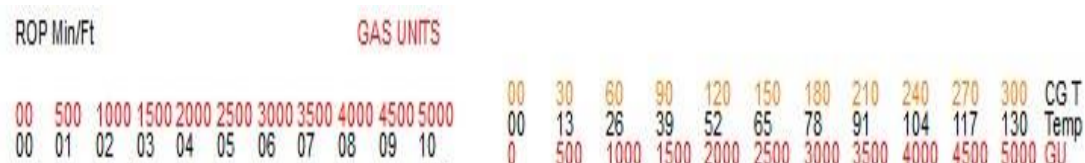
This line continually updates as you move around on the chart. The data is displayed for the cursor's location” in the historical time/depth on the chart.

This line displays the following:

- 1) Bloodhound Number.
- 2) Bloodhound Job Number.
- 3) Date/Time at cursor's location.
- 4) Depth at cursor's location.
- 5) Gas Units at cursor's location.

3.2 LEGEND

Below the Status Line and above the actual chart is the legend. The legend denotes the scale and color of the charted item, except in cases where doing so is not feasible (such as multi-colored items). This legend will change depending on which charting items you have selected in “Program and Equipment Setup” (covered later in this manual). Below is an example of the legend that was captured from the demo database with which Gas Chart initially loads:



3.3 GAS OVER TIME CHART

The right hand side of the Main Screen is the Gas Units Chart over Time. This graph is charting gas units, and potentially other data, by time, minute by minute. The horizontal scales for the plotted data items are shown at the top of the Gas Units Chart.

3.3.1 GAS CHART TIME AND DATE

In off-yellow, on the right hand side of the chart, every hour there is a time and date displayed. This is the time and date that is transmitted by the Bloodhound instrument. (Be aware that, when running remotely, the Bloodhound could be in a different time zone.) The time and date continues to be charted as long as there is an input to the Gas Chart software, either locally from the Bloodhound, or from the Bloodhound remotely through the Data Center.

3.3.2 GAS UNITS LINE

The red graph line represents the gas units that have been detected over time. The red gas units scale at the top of the chart can be changed as explained below. As the gas unit data flows into the Gas Chart program from the Bloodhound gas detection equipment, the user does not have to be concerned about off scale readings. If the gas units go off scale, no data are lost. If the gas units are off the current scale, the user can adjust the scale to view the gas by making a simple entry in the Chart Control Box.

3.3.3 CHROMATOGRAPH LINE

The dark blue line displays the raw chromatograph output. If the iBall Instruments equipment is furnished with the built in chromatograph, and if the user selects the chromatograph viewing function in the Chart Control Box, the user will see the output of the chromatograph on the left hand side of the gas chart in miniature form. (If your iBall Instruments equipment is not equipped with chromatograph hardware, then a flat blue line will appear in that area.) Each time a gas sample is injected into the chromatograph, a small red tick line will intersect the blue line. If the user chooses to zoom into the Gas Units Chart, the separations will become more noticeable. The user is also provided with the ability to select a portion of the chromatograph output and have the computer display the chromatograph data in larger format. This feature is explained below.

3.3.4 HYDROGEN SULFIDE (H₂S) LINE

The orange colored line represents the hydrogen sulfide detection in parts per million (PPM). When enabled for viewing, there will be an orange colored line drawn to indicate the presence of H₂S. The scale for the H₂S detector is from 0 to 500 PPM of H₂S. If your iBall Instruments gas detection system does not have the H₂S detector installed, there will be a flat line shown on the display. This scale is not adjustable.

3.3.5 BLUE DEPTH TICK MARKS

If “Edited Geograph” is selected in the Chart Control Box, blue tick marks will appear with the depth denoted beside them at five foot intervals the left hand side of the gas chart. All Bloodhound Gas Detection systems are equipped to detect foot/meter changes, either through connection to a geograph depth switch, or from a WITS (Wellsite Information Transfer Specification) interface. If the drilling rate is rapid, these foot or meter ticks will run together and appear as a blue streak. The zoom function in the Chart Control Box provides the user the ability view the ticks in detail. If the

Bloodhound connected to a WITS interface, green tick marks will be displayed to indicate tenths of a foot.

3.3.6 RED DEPTH TICK MARKS

If “Raw Geograph” is selected in the Chart Control Box, red depth tick marks will appear. These are called raw tick marks because these are the original (unedited) depth marks. Viewing these unedited marks allows the user to note the differences between tick marks that have been edited and the originals.

3.4 DEPTH/ROP CHART

The left hand side of the Main Screen is the rate of penetration (ROP) Chart. The ROP Check Box must be checked in the Chart Control Box for the ROP Chart to appear. The ROP is plotted by depth, foot by foot.

3.4.1 ROP LINE

When the ROP Check Box is checked in the Setup/Charting tab (Depth Based charting items) from the Chart Control Box, a black ROP line is plotted in minutes per foot, with the depths shown to the left. The horizontal ROP scale can be adjusted on the same tab in Setup as described later.

3.4.2 AUTO ROP LINE

When the Auto ROP Check Box is checked in the Chart Control Box, the plotted ROP line is dark red, and is corrected for the slow feet caused by making connections.

3.4.3 LAG GAS UNITS LINE

When the Lag Gas Check Box is checked in the Chart Control Box, the lagged gas units are plotted in red foot by foot on the ROP chart. The lag is calculated based on the settings in the “Chart Control Box / Setup Box / Lag

Tab,” described in a following section. When lagged gas units are plotted on the ROP Chart, they have the same horizontal scale as gas units plotted on the Gas Units Chart. If the lagged gas units are off the current scale, the user can adjust the gas units scale in the Chart Control Box.

3.4.4 LAG GAMMA LINE

When the Lag Gamma Check Box is checked in the Chart Control Box, and the Bloodhound is connected to the WITS system and lagged gamma data is being entered into the WITS system by Measurement While Drilling (MWD) or directional personnel, the lagged gamma data are plotted on the ROP Chart as a green line.

3.5 NAVIGATION – VERTICAL CHART SCROLLING

Fine and large vertical movements are possible within the Gas Chart software Main Screen.

3.5.1 LARGE MOVEMENTS

On the very far left hand side of the Main Screen there is a jump bar. This is a vertical line with depth numbers next to it that goes from the top to the bottom of the chart. This represents all the data in the database. To make a large movement in the database, place the cursor near the vertical line at the desired depth so that a double-ended arrow appears, and left-click. This will take the user to that approximate point in the database and display the data. After clicking, a red carrot (>) indicator on the jump line will show what part of the database is currently displayed. This view will only remain until the next time the chart is refreshed, either manually or automatically.

3.5.2 FINE MOVEMENTS

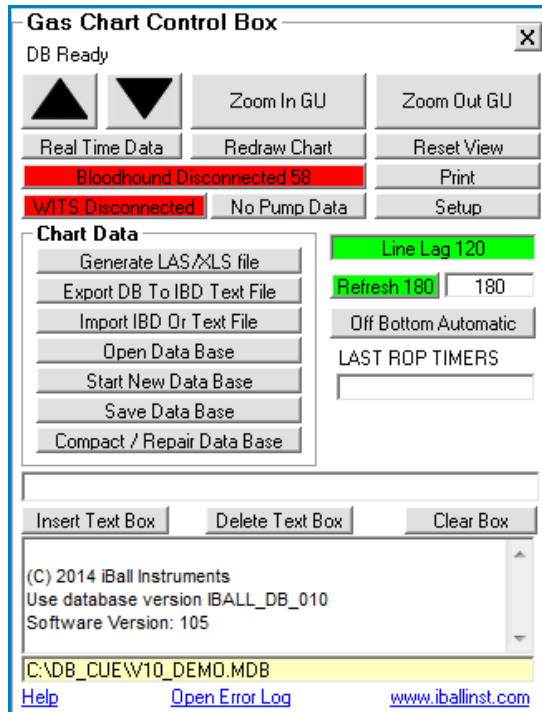
Fine movements in the database are accomplished by holding down a shift key and then holding down the left mouse button and moving the mouse up and down. This operation will move “ghost” gas units up and down that show where the Gas Units Graph will move to when the mouse button is released. The user is thus able to make fine movements.


3.5.3 CONTROL BOX ARROWS

In addition, there are up and down arrow buttons (black triangles) in the Chart Control Box that permit the user to jump up or down a page at a time:

4 GAS CHART CONTROL BOX

The Gas Chart Control Box is the main control point of the program (as shown below). It allows the user to control what is seen on the Gas Units Chart and ROP Chart, select the input of data to the program, generate output from the program, control view, control scale, and insert and delete text within the chart.



To bring the Chart Control Box up for use, the user must **RIGHT CLICK** anywhere on the Gas Chart Main Screen. To remove the Chart Control Box the user must **LEFT CLICK** on the Main Screen or click on the small  in the upper right hand corner of the Chart Control Box.

4.1 CONTROL BOX BUTTONS

The main control buttons in the Control Box are described below:




- Page Up and Page Down Buttons.

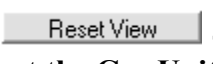
In the upper left hand corner of the Chart Control Box, there are two arrow buttons that enable the user to go up or down a page on the Main Screen.

A rectangular button with a light gray background and a thin black border. The text "Zoom In GU" is centered in a black, sans-serif font.

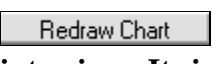
- Zoom In GU will allow the user to see more detail on the Gas Units Chart and will change the scale from 1" per hour to 2" per hour. Pressing this button again will double the scale to 4" per hour and so forth.

A rectangular button with a light gray background and a thin black border. The text "Zoom Out GU" is centered in a black, sans-serif font.

- Zoom Out GU will allow more gas chart data onto the screen at one time. Reverse effect as described above.

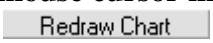
A rectangular button with a light gray background and a thin black border. The text "Reset View" is centered in a black, sans-serif font.

- Reset View will instantly set the view to the newest data and set the Gas Units Chart to 1" per hour. This is handy if you get lost in the database, or zoom in or out too much and want a speedy way to get back to a known position.

A rectangular button with a light gray background and a thin black border. The text "Redraw Chart" is centered in a black, sans-serif font.

- Redraw Chart button does **NOT** bring the most recent data into view. It simply refreshes the chart that is currently being viewed. For example, if the user clicks or unclicks the "Raw Chromatograph" chart item, th button then must be pressed in order to view the changes that the user has made.

A green rectangular status bar with black text that reads "Connected: 59 TCP 100%".

- Bloodhound Connected/Disconnected button. Normally this button is green. The number in the window is the Main Screen automatic refresh (update) cycle in seconds. The default is 120 seconds (2 minutes). To change the refresh rate, place the mouse cursor in the window and enter the desired refresh rate, then hit the  button. The Number on the green Refresh button counts down the seconds until the next refresh. The number in the Refresh Text Box above the Gas Units box is a client entered second count-down timer that defaults to what is entered in the box whenever a new packet of Bloodhound information is received. If the Refresh button above the text box is red then it will count down and retry to connect to the Bloodhound every 120 seconds (the default setting, or whatever is entered in the text box below the Refresh button). If




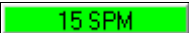
NOTE: If the "Connected" button does not show green, then Gas Chart is either not connected to the Bloodhound, or has not been connected long enough for the light to turn (up to one minute).




TRY ME: To disable the Main Screen automatic refresh cycle, click on the green “Refresh” button. This button will turn red with the wording “Refresh Off”. This function is useful for disabling screen updates while working on an up-hole footage renumbering issue. To resume the rerefresh cycle, click the “Refresh Off” button and it will turn green).

the user clicks on this button, the button will turn gray and the software will not attempt to connect to the Bloodhound (and will disconnect if connected). If the button is gray, clicking on it again will turn it red or green and the software will attempt to connect to the Bloodhound.

 – WITS Connected button will turn this button green if the Bloodhound has detected WITS input. The number in the button is a 30-second count down timer that resets to 30 whenever a new packet of WITS information is received. This button will turn red if no WITS input has been found.

 – SPM button shows the number of total pump strokes per minute coming in from WITS. When WITS pump stroke data is not being received, the button turns gray and reads No Pump Data. When logging without WITS input (e.g. with a geograph setup), clicking the button toggles between “Pumps On” and Pumps Off”.

 – Print button will allow the user to print the current visible chart to a printer that is connected to the computer. Before pressing the Print button the scale of the print can be set using the ROP Inches Per 100 ft box.

 – Setup button will allow the user to set the Gas Chart software preferences and is explained in detail later in this document.



NOTE: The user does not have to know which serial port the Bloodhound is connected to. Gas Chart will search the ports and attempt to connect, and then will identify whether the port has a Bloodhound connected, and select it automatically.



TIP: In the top-center section of the Real-Time Data screen is a table denoting a number of Bloodhound “critical stats”. These are highly useful in diagnosing issues such as problems with the rig-up and mud, and also are key indicators that can be used to discuss issues with on-site well operations staff.

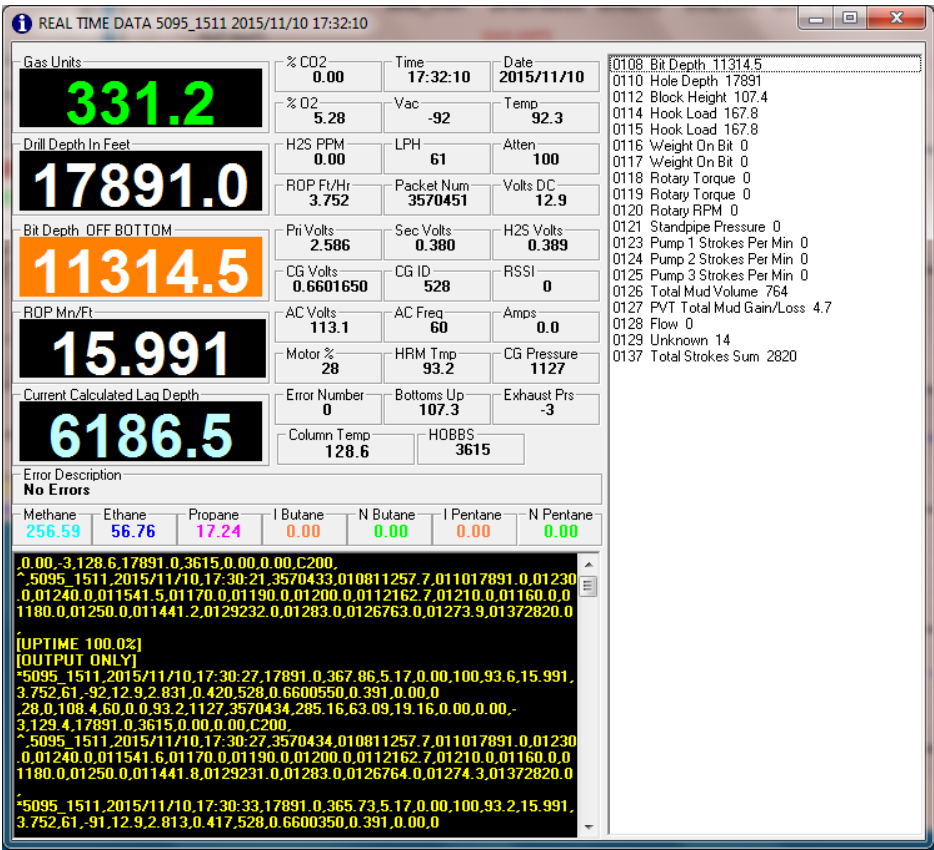


- Real Time Data button opens a new window that allows the user to see the real-time data that is being received from the Bloodhound gas detection system. This is an excellent method to verify that the Bloodhound instrument is running and communicating. This is explained in further detail in the following section.

5 REAL-TIME DATA

The Real Time Data window provides important parameters from the connected Bloodhound. The RTD window will provide the Bloodhound Serial Number, the Job Number, and the date and time of the most recent data packet received in the header (top left of pop up window, as pictured below). Important parameters are shown in large boxes at the upper left to include Gas Units, Hole Depth, Bit Depth, ROP in Mn/Ft and the Current Calculated Lag Depth.

If the Gas Chart software is running locally, the Lag Depth shown is that calculated within the Gas Chart software, based on the settings in the “Chart Control Box / Setup Box / Lag Tab,” described in a following section. If the Gas Chart software is running remotely, the Lag Depth shown is that being calculated by Gas Chart software running on the wellsite, and transmitted through the Bloodhound to the WITS system.



All of the Bloodhound parameters to the left of the large boxes mentioned above are described below.

5.1 PARAMETER DESCRIPTIONS

<div><div>% CO2</div><div>0.00</div></div> <div>CO2</div> <div>– Current %</div>	<div><div>Time</div><div>17:32:10</div></div> <div>data packet from the Bloodhound.</div> <div>– Time of last</div>	<div><div>Date</div><div>2015/11/10</div></div> <div>packet from the Bloodhound.</div> <div>– Date of last data</div>
--	---	---

<p>% O₂ 5.28 - Current % O₂ dependent on altitude, usually about 21% when drawing air. Used in Total Gas calculation – VERY important!</p>	<p>Vac -92 - Current Vac on sample line suction in millimeters mercury (mmHG), (absolute)</p>	<p>Temp 92.3 - Circuit board temperature, °F</p>
<p>H₂S PPM 0.00 - H₂S sensor reading in parts per million. This number will always be higher than a detector waved over the mud pit because the extractor (agitator) lowers the surface tension inside the body of the device, extracting more gas than turbulent flow alone.</p>	<p>LPH 61 - Sample flow in liters per hour. Part of feedback loop, calibrated at 60 LPH. When LPH drops below the set flow, the motor speed increases; when it is above the set flow the motor speed decreases. The Bloodhound can function fine with a set motor speed (i.e.bypassing a bad flow meter).</p>	<p>Atten 100 - Attenuation setting. 100% (default) means 100 units in = 100 units detected. 50% is 100 units in = 50 units detected. Anything other than 100% alters the highest saturated gas number. Example: 30% will read 3,000 units MAXIMUM.</p>
<p>ROP Ft/Hr 3.752 - Rate Of Penetration in Feet per Hour.</p>	<p>Packet Num 3570451 - Packet Number (most recent).</p>	<p>Volts DC 12.9 - Volts DC meter for internal voltage.</p>
<p>Pri Volts 2.586 – Primary gas sensor voltage</p>	<p>Sec Volts 0.380 – Secondary gas sensor voltage</p>	<p>H₂S Volts 0.389 – H₂S sensor voltage</p>
<p>CG Volts 0.6601650 – chromatograph sensor voltage</p>	<p>CG ID 528 – most recent chromatograph run sequential ID number</p>	<p>RSSI 0 – Received Signal Strength Indication from the modem.</p>
<p>AC Volts 113.1 – incoming AC voltage</p>	<p>AC Freq 60 – incoming AC frequency, Hz</p>	<p>Amps 0.0 – amperage going out the 12 volt connector (cavitator). Register 37 set to</p>



NOTE: RSSI only indicates signal strength in “cell bandwidth”, not specifically by provider. This means the %RSSI showing of 70% may be for a carrier other than the one for the Bloodhound.



NOTE: Whenever more than one alarm condition is currently being met, the Error Description on this page will show “UNKNOWN”. In those cases, the multiple Error Numbers will be displayed in the “Error Number” field on this page, separated by commas.

		alarm at 5 amps, shut off at 6 amps.
Motor % 28 - percent duty of the sample pump motor	HRM Temp 93.2 – temperature at the gas detector, °F	CG Pressure 1127 – chromatograph pressure in mmHg (absolute), will alarm at 700 mm Hg
Error Number 0 - Any alarm from the Bloodhound will have an associated Error Number that will be displayed here. A table of alarm codes is available in the Bloodhound user manual, or can be deciphered by contacting iBall Technical Support.	Bottoms Up 107.3 - Estimate Time (in minutes) for bottoms-up to occur. This is the amount of time it takes the mud at the bit to reach the surface.	Exhaust Prs -3 – In the Bloodhound Standard, this is the back-pressure in the exhaust line from the Bloodhound, mmHG (absolute). In the Bloodhound Enhanced, this is a reference point to barometric pressure (an arbitrary scale – not mmHg).
Column Temp 128.6 - Chromatograph column temperature from the CG Temp sensor is displayed here.	HOBBS 3615 – Number of hours the Bloodhound has been running. This meter can be reset by Tech Support to complete current well but only 500 hours can be granted while in the field. 1 st alarm is at 4000 hrs and shuts off pumps at 5000 hrs. Gives no error number or description.	

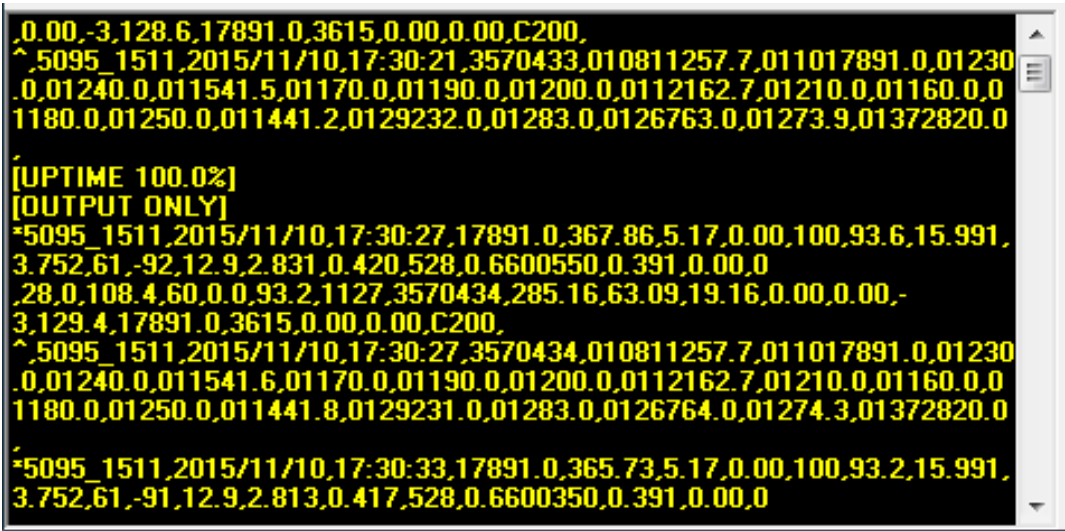
Directly under these parameters there is a text box that will display an error description (if available) that will correspond to the Error Number parameter above (as pictured below).

Error Description
No Errors

Directly under the Error Description text box are the levels of the gas components, methane (C1) through normal Pentane (n-C5), detected during the most recent chromatograph cycle.

Methane	Ethane	Propane	I Butane	N Butane	I Pentane	N Pentane
256.59	56.76	17.24	0.00	0.00	0.00	0.00

The bottom left of the RTD window is a communications window that displays in real time the data packets being received from the Bloodhound or the Data Center (as pictured below). The sequence of data items contained in these comma-separated text data packets is described in further detail Bloodhound User Manual.



The far right of the RTD window will display, if any, the data coming into the Bloodhound from the WITS interface connection (as pictured below).


```

0108 Bit Depth 11314.5
0110 Hole Depth 17891
0112 Block Height 107.4
0114 Hook Load 167.8
0115 Hook Load 167.8
0116 Weight On Bit 0
0117 Weight On Bit 0
0118 Rotary Torque 0
0119 Rotary Torque 0
0120 Rotary RPM 0
0121 Standpipe Pressure 0
0123 Pump 1 Strokes Per Min 0
0124 Pump 2 Strokes Per Min 0
0125 Pump 3 Strokes Per Min 0
0126 Total Mud Volume 764
0127 PVT Total Mud Gain/Loss 4.7
0128 Flow 0
0129 Unknown 14
0137 Total Strokes Sum 2820

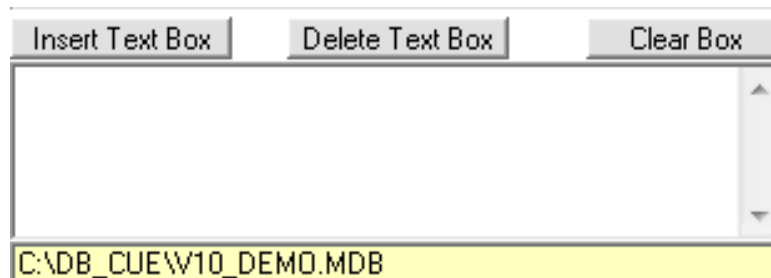
```

5.2 ANNOUNCEMENT WINDOW



NOTE: The “Rule of Thumb” regarding messages in the Announcement Window is that if the program appears to be behaving normally (updating, keeping up, etc.), and the data exported to the log is of good quality, then messages and error codes here are generally “handled conditions” within the program which are stated merely for informational purposes.

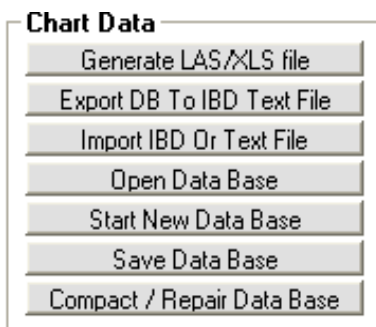
At the bottom of the Control Box, just above the program and database directory path is the Announcement Window (as picture below). Text and color will appear in this window to announce both Gas Chart-generated conditions and Bloodhound alarms. A list of Bloodhound conditions that can be reported is provided in Appendix A. Typical Bloodhound conditions that will be reported are “High Gas Units,” “Low Sample Flow,” and “Blocked Sample Line.”



This window is used to Insert Text onto your Chart is desired. See section 3.6 Text Controls below for more detail.

5.3 CHART DATA BOX

The Chart Data Box (as pictured below) allows the user to Import, export and otherwise control data flow and storage locations.



NOTE: iBall suggests using an entirely different file name each and every time you export data so that if you need to go back and reference a prior export, it is still available..

Generate LAS/XLS file

- The Log ASCII Standard (LAS) file generator permits the user to generate a file that is compatible with most mud logging software packages. When hitting this button, the user will be asked to supply a file name that will be saved to the C:\DB_CUE directory. At the same time an XLS file is generated and placed in the same folder (default is to generate both but can be configured to do one or the other). The difference between the two is that the LAS file will not duplicate feet depth and will place a – 999.99 on missing feet. The XLS file will display duplicate feet, and will not show missing feet. All data is time and date stamped.

Export DB To IBD Text File

- The data that comes into the Gas Chart program is in packet form. Within Gas Chart, the packet is taken apart and stored in a Microsoft Database File or “.MDB”. This button will take the data that has been stored in a MDB file and save it into a comma-delimited text file. Text-based data files are a convenient export file type because they can more easily transposed into various file formats.

Import IBD Or Text File

- This button will take a text-based file and import it into the current database. The Bloodhound system stores all the data on the

USB key and internal SD card in this text-based file format. This function is useful for filling in any holes that exist in the Gas Chart program database, but not in the text based file contained on the USB key. Taking the USB key from the Bloodhound system and inserting it into the computer will enable the user to pull from the USB key any data that may be missing from the Gas Chart program database.

Open Data Base

- All data that is viewed in the Gas Chart program comes from a Microsoft Database or MDB file. To select a file to open, the Open Data Base button is hit and the directory and file name is selected (C:\DB_CUE). The program then opens the file and displays the contents. However, if the Bloodhound is connected (green), new data will be written to the database. So if you want to just look at a database and not put new data into it from the running equipment, you will have to turn off the green Bloodhound Connected button.



NOTE: Saving a Data Base does not affect the current database or its contents. It just copies the current database to another location for safe-keeping.

Start New Data Base

- This button starts a fresh empty database. This is used when starting a new well. The user will be prompted for a file name to organize the data to be saved. When Start New Data Base is selected, a blank white chart will be displayed on the computer, because this is an empty database, and there is not yet anything to plot.

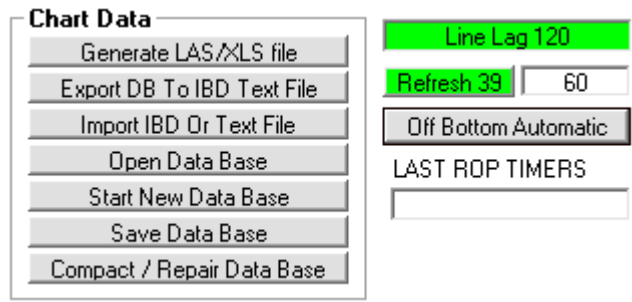
Save Data Base

- Data is constantly being written to the named database when data is being collected. This button allows for the user to make a copy of the current open database to another location or another drive.

Compact / Repair Data Base

- This is a database utility. This will check the database for errors or other problems, and will then re-index the database if it needs it. It will also add any fields that are missing and remove any duplicate entries. This utility is automatically run every time the Gas Chart program starts.

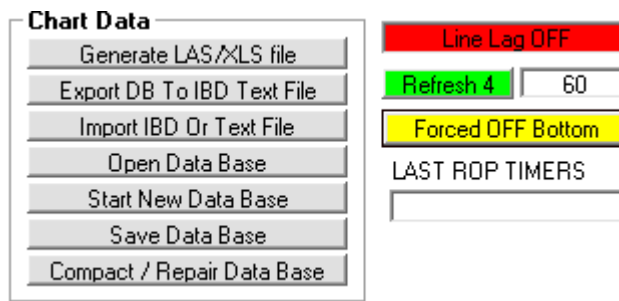
Stuff to the right of the Chart Data Box (as pictured below)



Line Lag is the time set on the Auto ROP/LAG tab, in the box below Surface/Line Lag.

Refresh is two parts: the Green box is the countdown timer for the chart refresh in seconds, based on the number in the white box next to it.

The **Off Bottom Automatic** button can toggle Forced OFF Bottom when using a geograph switch, or



The screenshot shows a software interface with a 'Chart Data' menu on the left and several controls on the right. The 'Chart Data' menu includes buttons for 'Generate LAS/XLS file', 'Export DB To IBD Text File', 'Import IBD Or Text File', 'Open Data Base', 'Start New Data Base', 'Save Data Base', and 'Compact / Repair Data Base'. To the right, there is a green button labeled 'Line Lag 120', a green button labeled 'Refresh 41' next to a text box containing '60', an orange button labeled 'Forced ON Bottom', and a section titled 'LAST ROP TIMERS' with an empty text box below it.

Forced ON Bottom. Both Forced buttons will flash between yellow and orange to get your attention so that they are not left on as you drill.

Lastly, the **LAST ROP TIMERS** list the last foot that the drill made in seconds (keeps three before over-writing with new footage).

5.4 TEXT CONTROLS

The screenshot shows a text control interface. At the top, there are three buttons: 'Insert Text Box', 'Delete Text Box', and 'Clear Box'. Below these buttons is a large, empty text input area with a vertical scrollbar on the right side.

The text input area and associated buttons permit the user to insert and remove text boxes within the database, and to make notes on the Gas Units Chart itself.

Clear Box - First press Clear Box and then enter desired text in the Text Input Window located below the three buttons.

Insert Text Box - Insert Text box will “stick” the input text to the cursor. The user then places the cursor over the area where he or she wishes to insert the

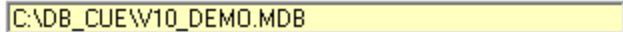
text, and then clicks the left mouse button to “stick” the text onto the Gas Units Chart.

To move text already on the Gas Units Chart, left click on the text, move it to the desired location, and left click again to drop it at the new location.

 - To delete a text entry from the chart, left click on the text, and then click on Delete Text Box.

5.5 FILE NAME WINDOW

Directly below the Text Input Window is a yellow-tinted window that displays the file path and name of the currently open Gas Chart database (as pictured below). Our recommendation is to create and save all databases and LAS/XLS files in this default directory as mentioned in the Getting Started section for best operating results.



C:\NDB_CUEW10_DEMO.MDB

5.6 HYPER LINKS

At the bottom of the Gas Chart Control Box are three hyperlinks.

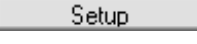
[Help](#) [Open Error Log](#) www.iballinst.com

Clicking on the "Help" link will open up this Manual. You do not need to be connected to the Internet to see this help.

The “Open Error Log” link opens a log of alarm messages that have been received from the Bloodhound , and error messages that have been generated by the Gas Chart software. Scroll to the bottom of the window to view the most recent alarms and error messages.

If an internet connection is active, the “www.iballinst.com” button allows the user to go to the iBall Instruments home page where information and downloads are available.

6 SETUP


On the Gas Chart Control Box, the  button opens the Program and Equipment Setup Screen (as pictured below). This screen allows the user to set program options. The screen is composed of six (6) tabs which we will cover from left to right respectively. The tabs of particular interest include in order: Bloodhound, LAS/XLS Files, Auto ROP/LAG, and Charting. The two end tabs are not critical, but do include features such as auto alarms within the program, and rudimentary data tallying. Each Tab is described below in order from left to right.

6.1 ALARMS/AUDIO



NOTE: For audio alarms to function, the computer must have a properly-configured sound card and speakers.

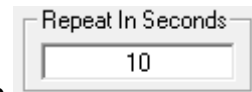
The first tab displayed (Alarms/Audio) allows the user to set a number of Gas Chart-generated alarms to notify the user of certain events. First, the user must select a sound file to play when the alarm is triggered.

You may select or add a sound that will be the “alarm” whenever one of the conditions defined on this page is met. The program comes with three (3) sounds that the user can select from, or the user can supply one. If you choose to use your own sound file, the sound file must be a WAV file, and located somewhere on the computer where it can be easily located. After selecting a WAV file, hitting the  button will play the file through the PC sound card (to the computer speakers or head phones) for testing and volume adjustment.



The next selection is to check the ☐ Metric Units option if the user desires to set the Gas Chart alarms using metric units.

The third setting is the ☐ Alarm On Bloodhound Alarm option. When this box is checked, ANY alarms that sound on the Bloodhound instrument will cause the Gas Chart alarm to sound. Text and color will appear in the Announcement Window located on the Gas Chart Control Box below the Scale Setting Area to announce both Gas Chart-generated alarms and Bloodhound conditions. A list of Bloodhound conditions that can be reported is provided in Appendix A. Typical Bloodhound conditions that will be reported are “High Gas Units,” “Low Sample Flow,” and “Blocked Sample Line.”

A screenshot of a software interface element. It consists of a rectangular box with a light gray border. Inside the box, the text "Repeat In Seconds" is displayed at the top. Below this text is a smaller, white rectangular input field containing the number "10".

When the Gas Chart alarm is triggered, the  box will cause the sound to repeat every so many seconds. The default is 10 seconds.



NOTE: When running remotely, the “Alarm on Lag Depth” function uses the lag depth calculated within the Gas Chart software and not the lag depth calculated by the Gas Chart running at the Bloodhound’s location. Likewise, the “Time and Date” alarm will trigger when that time and date are reached on the computer running the Gas Chart software rather than that of the computer running next to the Bloodhound.

To set a specific Gas Chart-generated alarm, check the appropriate alarm selection box (or boxes) and fill in the desired values in the windows. This is a two-step process. First, you must activate the specific alarm by checking the appropriate box on the right and then you must fill in the parameters (if applicable) for the specific alarm to the left of the check box...

Alarm Settings

Repeat In Seconds		2500		<input type="checkbox"/> Lost Connection To WITS Feed
10		25		<input type="checkbox"/> Lost Connection To Bloodhound
		5000		<input type="checkbox"/> Next Depth That Comes In
		5000		<input type="checkbox"/> Alarm On Lag Depth
		1500		<input type="checkbox"/> Long Drilling Depth In Minutes
24 Hour	13:36:04	10-Nov-2015		<input type="checkbox"/> Hole Is Greater Than This Hole Depth
	10	2.5		<input type="checkbox"/> Bit Is Greater Than This Bit Depth
	Depth	ROP		<input type="checkbox"/> High Gas Units
				<input type="checkbox"/> Time And Date: Next Alarm at: 11/10/2015 1:36:04
				<input type="checkbox"/> Drill Off / Drilling Break
				<input type="checkbox"/> Number Of Feet With Less Than ROP Value

6.2 AUTO ROP/LAG

This Tab is for setting up the Auto ROP and Gas Units Lag, Gamma Tool and Surface/Line Lag. For the Gas Units Lag, the user can select between generating the lag using pump strokes (if WITS is active) or from time and depth, otherwise Time/Depth is the only option.



NOTE: You can calculate LAG using either WITS Pump Strokes (WITS Standard Channels 0123, 0124, and 0125 respectively) or using Time over Depth, which is generally used when WITS is unavailable or not providing the correct parameters to lag, such as when using a Geolograph.



NOTE: The “Generate Lag Using Pump Strokes” method requires that the Bloodhound is connected to a WITS interface and that the provider is sending SPM by pump on the ANSI Standard WITS channels for SPM (0123, 0124, 0125).

First, select the type of lag you are using by selecting either Generate Lag using Pump Strokes or Generate Lag Using Time / Depth in the bottom-right corner of this page.

6.2.1 GENERATE LAG USING PUMP STROKES METHOD:

To use the pump strokes method, the user clicks the round radio option next to Generate Lag Using Pump Strokes, and enters the strokes per 100 feet of

hole in the corresponding box in the center of the screen (see figure below). (To calculate the strokes per 100 feet of hole, divide the bottom-up strokes by the hole depth, then multiply by 100. For instance, if the hole is 5,000 feet deep with 2,800 bottom-up strokes, $(2,800 \div 5,000) \times 100 = 56$ strokes per 100 feet.)



NOTE: If WITS Pump Channels are not present, or the channel is sending a negative number, this will be interpreted by Gas Chart as “zero SPM”.

The setting will be saved upon closing the Setup window. Information can often be obtained from the Mud Engineer or Mud Report. For example, for a 7 7/8-inch diameter hole containing 4 1/2-inch drill pipe, the annular volume of 1,000 feet of hole is about 41 barrels (bbls). For a pump with a capacity of 0.0725 bbls per stroke, it would take about 56 strokes to circulate 100 feet of hole. For a hole 5,000 feet deep, it would take about 2,800 strokes (5×560) to achieve bottoms-up.

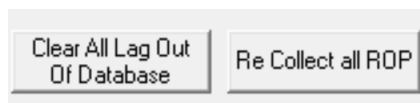
6.2.2 GENERATE LAG USING TIME/DEPTH METHOD:

To use the time/depth method, the user clicks the round button next to “Generate Lag Using Time /Depth,” and enters the known minutes of lag

time at a known depth. For example, for a 7 7/8-inch diameter hole containing 4 1/2-inch drill pipe, the approximate annular volume at a depth of 5,000 feet is about 203 bbls. For a pump with a capacity of 0.0725 bbls per stroke running at 60 strokes per minute, it would take about 47 minutes to circulate bottoms-up. Minutes of lag can also be determined by a bottoms-up test using carbide or other material, or by converting the number of strokes needed to minutes (2,800 strokes ÷ 60 strokes per minute = 47 minutes). The Bottoms Up Minutes window will give the current lag minutes for the current depth.

With either method, the user will have to periodically adjust the settings to best match drilling breaks to gas increases. This is due to the many real-world factors that affect lag, including changes in hole washout and pump efficiencies, among others.

If the user wants to recalculate the lag time for any depth or range of depths, the right hand side of the tab will allow the user to adjust the lag times for the whole database or just a section of it based on feet. If the user wishes to recalculate the lag for the whole database, select the type of lag calculations, adjust the lag variables, and then hit the red button. The program will recalculate the lag based on the settings that the user provides. If the user wishes to recalculate the lag for a range of feet, then the user should enter the starting and ending feet that will be recalculated, and then hit the yellow button to just recalculate the lag within the range selected. If footage is missing from the database because of driller recalculation or other problems, the brown button “Insert Missing Packet Place Holders Into The Data Base” should be pressed to try correcting the errors.



6.2.3 ZONES

To the right of the center panel where strokes and/or time per 100-feet of lag are entered, you will notice a vertical set of tabs containing zones. Zones indicate potential changes in diameter of the hole over depth. Below are some notes on this feature.



6.2.4 GAMMA TOOL

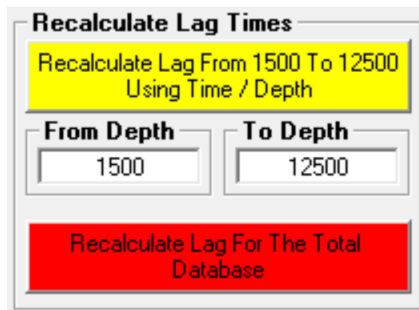
Gamma Tool
Manual Gamma Tool
Depth Behind Bit
[Override WITS Gamma Lag](#) ☒

6.2.5 SURFACE/LINE LAG

Surface/Line Lag
 Seconds ☐ [Disable Line Lag](#)

Insert Missing Packet Place Holders
Into The Data Base

6.2.6 RECALCULATE LAG TIMES



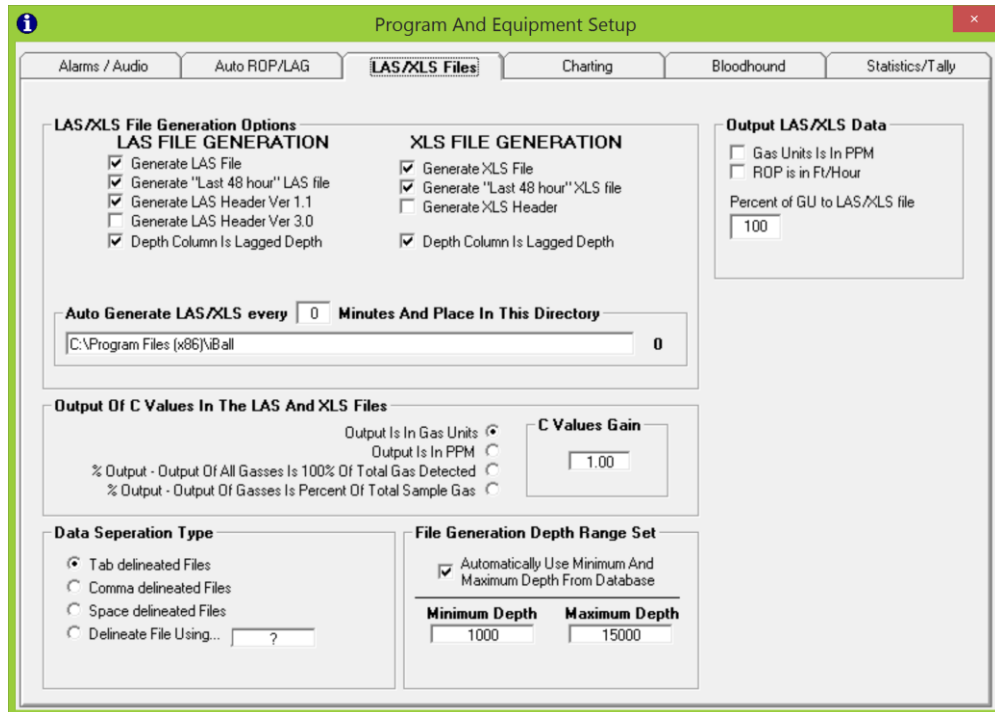
The dialog box titled "Recalculate Lag Times" contains a yellow button labeled "Recalculate Lag From 1500 To 12500 Using Time / Depth". Below this are two input fields: "From Depth" with the value "1500" and "To Depth" with the value "12500". At the bottom is a red button labeled "Recalculate Lag For The Total Database".



CAUTION:

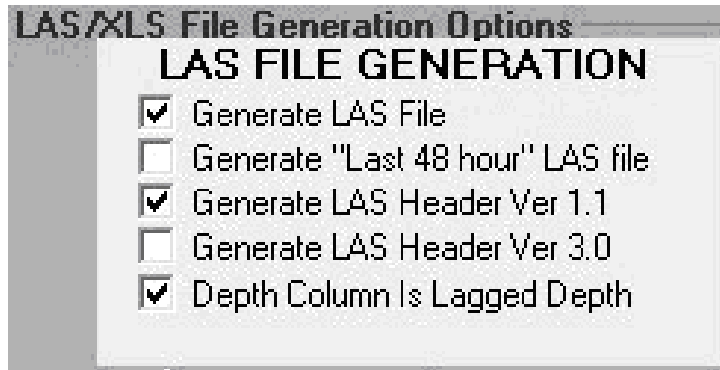
Calculate all of your lag into Zone 1, and avoid using other zones. Zone 1 is the only functional zone at this time. Zones beyond the first one are a beta test feature.

6.3 LAS/XLS FILES

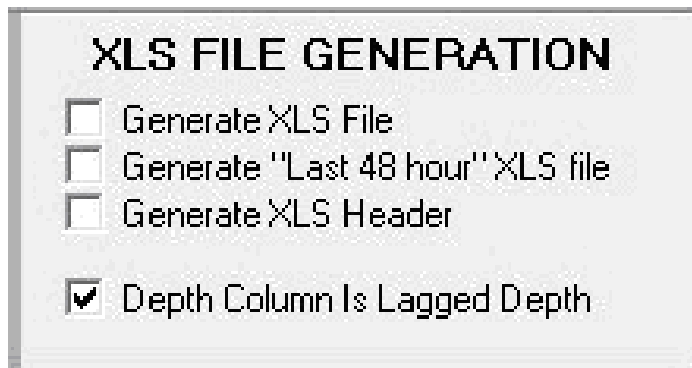


This Tab is for the LAS/XLS file generation. The user can chose to generate an LAS file, an XLS file, or both. The program default is to generate both.

LAS file options (see picture below) include whether to generate a file containing all the data or just the last 48 hours of data, the type of LAS file header to include, and whether the depth column is lagged depth.



XLS file options (see picture below) include whether to generate a file containing all the data or just the last 48 hours of data, whether to generate a header, and whether the depth column is lagged depth.



6.3.1 OUTPUT OPTIONS



NOTE: Changes to the output of your files will only impact the files themselves, and have no bearing on the visual presentation of the data whether in Gas Chart, or on the iBallRemote.com web page.

In the upper-right of this screen are settings for output of “Total Gas”, “ROP”, and “Percent of GU to LAS/XLS file” numbers in their file. (see picture below).

☐ Gas Units Is In PPM

Checking this box will generate the Total Gas column in your LAS/XLS file in Parts Per Million (PPM) rather than the default which is Gas Units, or the actual number displayed on the Bloodhound's LCD as Total Gas. PPM is one-thousand times the value of Gas Units.

☐ ROP is in Ft/Hour

Checking this box will change the ROP column on your LAS/XLS file to Feet per Hour rather than the default which is Minutes Per Foot.

Percent of GU to LAS/XLS file

100

This option is a number between 0 and 200, and acts as a multiplier from zero to a factor of 2.0 for the value that is ultimately written to the LAS/XLS file. For example, if you are displaying 500 gas units for a specific foot within Gas Chart, and this field contains a value of 50, the actual value in the LAS file will be 250 gas units, or fifty percent of the value recorded for that foot.



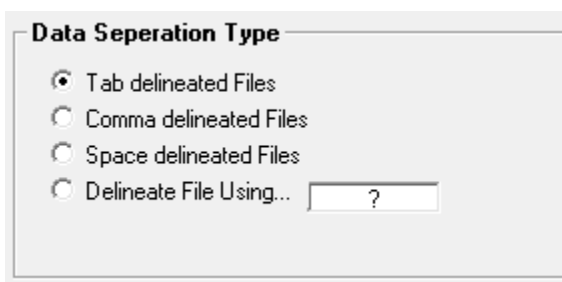
CAUTION: When dealing with percent output modifiers, it is best to leave the default of 100. Other numbers will produce unpredictable results in your log.

6.3.2 DATA SEPARATION TYPES

Defaulted to Tab (which is the standard for LAS files), this denotes what kind of ASCII character will be used in the LAS/XLS output to separate the values into columns (see picture below). In specific cases, a <TAB> may be insufficient, so the option to select alternative values; however, the default is best in most cases.



TIP: When using a strip-logging package with lithology, auto-generation is particularly useful if the package has the ability to automatically import files at specified intervals. Stagger your export and import by even intervals for the best results.



6.3.3 AUTO GENERATION

One nice feature of Gas Chart is the ability to automatically generate LAS/XLS files at specific intervals (see picture below). To enact this, one would enter a value other than zero (0) in the field reads Auto Generate

LAS/XLS EVERY Minutes And Place In This Directory”, where X is the number of minutes *between* each export. Generally ten (10) to thirty (30) is a good number and cannot be lower than 10.



NOTE: Auto-generation is not required for MainLog unless you wish to import H2S into that program.




6.3.4 C-VALUE OUTPUT TYPE AND GAIN

The next section is used to modify the C-Value output in your LAS/XLS files (see picture below). On the left are four choices for output which include

Gas Units (the default), Parts-Per-Million (PPM), Percent Totaling 100% of Gas Detected, and Percent Totaling Percent of Sample Gas.



NOTE: On rare occasions, WITS systems use odd factors to import gas, so the Total Gas Percent (see “OUTPUT OPTIONS” above) might be something out of the ordinary like 50 percent. In this case, one might need to set the C-Value Gain to 2.00 in order to double the C-Values on output so that they still add up to 100%.

On the right is the  (default 1.00). The C-Value Gain is a factor applied to the C-Value upon export to XLS/LAS only and does not impact data output to WITS, iBallRemote.com, or the Gas Chart software's chart or real-time data. This is used when one wants a different percent of C-Value Totalled Percent versus that of Total Gas.

6.3.5 DEPTH RANGE




NOTE: To export specific footage, the check box next to “Automatically Use Minimum And Maximum Depth From Database” must be un-checked, and a valid Minimum and Maximum depth specified.

We also have the ability to specify a range to export (see figure below). By default, the box labeled Automatically Use Minimum And Maximum Depth From Database is checked, which means that the entire data set from the shallowest footage in the current file/database to the deepest footage in the current file/database will be packed up in an LAS/XLS file when generating. This is usually the best option, but there may be some cases in which this might need to be changed.



TIP: When using a specific depth range, it's good practice to write down prior settings and then to remember to set back to the prior settings after your export. Not doing so could have a confusing result wherein either



 stops
g new
or stops at a
otage in the
NOTE: Changes
made on this page
are not reflected until
the next time the
actual chart is re-
drawn by the
program. This can
happen in one of two
ways: 1) It happens
automatically
roughly every two
minutes, and 2) the
user can force it to
redraw after exiting
this setup screen by
pressing on the Re-
Draw Chart button
from the Gas Chart
Control Box.

File Generation Depth Range Set

☒ Automatically Use Minimum And Maximum Depth From Database

Minimum Depth	Maximum Depth
<input type="text" value="1000"/>	<input type="text" value="15000"/>

6.4 CHARTING

Program And Equipment Setup

Alarms / Audio

Auto ROP/LAG

LAS/XLS Files

Charting

Bloodhound

Statistics/Tally

Chart Items

- ☒ Gas Units
- ☐ C Values
- ☐ Raw Chromatograph
- ☐ O2
- ☐ CO2
- ☐ H2S
- ☐ Peak Tags
- ☐ Edited Geolograph
- ☐ Raw Geolograph
- ☐ Off Bottom
- ☐ Pumps On / Off
- ☐ Weight On Bit
- ☐ Standpipe Pressure
- ☐ Rotary RPM
- ☐ Total Mud Volume

Chart Diagnostic Items

- ☐ Sample Line Vacuum/Flow
- ☐ Exhaust Pressure
- ☒ Case Temperature
- ☒ HRM Temperature
- ☒ Chromatograph Temp
- ☐ Chromatograph Pressure
- ☐ Extractor Amps
- ☐ Rig AC Voltage
- ☐ System DC Voltage
- ☐ Bit Depth
- ☐ Line Lag
- ☐ Show Inserted Packets
- ☐ Rotate/Flip Chart
- ☐ Show ROP As Ft/Hour

Chart Oil Indicator

- ☒ None
- ☐ Common Oil Indicator
(C3 + IC4 + NC4) / C1
- ☐ Baroid Oil Indicator
(C1 + C2) / (C3 + IC4 + NC4)
- ☐ Shell Method Oil Indicator
$$\left(\frac{C2 + C3 + IC4 + NC4}{C1 + C2 + C3 + IC4 + NC4} \right)^{100}$$
- ☐ Pixlar Oil Indicator
(IC4 + NC4) / C3

Chart WITS Item

- ☐ Chart WITS Item
- ☒ Total Strokes Per Min
- ☐ Total Strokes
- ☐ Inclination
- ☐ Azimuth
- ☐ Gamma

Monitor Custom WITS Items

Enter Custom WITS Channel Numbers And Descriptions To Store Into Database

0117	Weight On Bit
0121	Standpipe Pressure
0120	Rotary RPM
0126	Total Mud Volume

☒ ROP

☒ Laged Gas Units

☐ Laged Gamma

☐ ROP Smooth

Chromatograph Charting Modifiers

C1 Gain	1.00	<input checked="" type="checkbox"/> C1	Set C1 Color
C2 Gain	1.00	<input checked="" type="checkbox"/> C2	Set C2 Color
C3 Gain	1.00	<input checked="" type="checkbox"/> C3	Set C3 Color
IC4 Gain	1.00	<input checked="" type="checkbox"/> IC4	Set IC4 Color
NC4 Gain	1.00	<input checked="" type="checkbox"/> NC4	Set NC4 Color

RAW/ CG Visible Size 60000 ☒ Make Lines **BOLD**

Chart Scales

ROP Inches Per 100 ft 4

Gas Units Scale 0 to 500

WITS Display Scale 0 to 200

Oil Indicator Scale 0 to 100

ROP Scale 0 to 10

Gamma Lag Scale 0 to 100

Background Picture

Change Background Picture

Remove Background Picture

Change Background Color



NOTE: When looking at the actual chart on the main page of Gas Chart, there are actually two completely separate charts represented. There is a thick, black vertical line in the middle of the page that separates the two charts. On the left side is the depth-based chart, which generally displays gas and ROP over the depth in regular increments.

The Charting tab is one of the most versatile and useful mechanisms within Gas Chart. Mastering this tab will allow for quick analysis of the bases in a well, drilling activity, problems with mud, presence of petroleum, and problems with rig-up, equipment, and configuration of the Bloodhound.

6.4.1 CHART ITEMS – TIME-BASED (RIGHT-SIDE)

The upper left section contains selections for what gases and other critical logging values to draw on the chart on the right side, or time-based section of Gas Chart (see picture below). These range from Gas Units to Total Mud Volume.

Chart Items	
<input checked="" type="checkbox"/>	Gas Units
<input type="checkbox"/>	C Values
<input type="checkbox"/>	Raw Chromatograph
<input checked="" type="checkbox"/>	O2
<input checked="" type="checkbox"/>	CO2
<input type="checkbox"/>	H2S
<input type="checkbox"/>	Peak Tags
<input type="checkbox"/>	Edited Geolograph
<input type="checkbox"/>	Raw Geolograph
<input type="checkbox"/>	Off Bottom
<input type="checkbox"/>	Pumps On / Off
<input type="checkbox"/>	Weight On Bit
<input type="checkbox"/>	Standpipe Pressure
<input type="checkbox"/>	Rotary RPM
<input type="checkbox"/>	Total Mud Volume
<hr/>	
<input checked="" type="checkbox"/>	ROP
<input checked="" type="checkbox"/>	Laged Gas Units
<input type="checkbox"/>	Laged Gamma
<input type="checkbox"/>	ROP Smooth

The table below identifies and describes each of these optional items to chart, respectively:

ITEM	DESCRIPTION
<input checked="" type="checkbox"/> Gas Units	Total Gas over time in the form of a red line, as displayed on the Bloodhound's LCD. This value will show situations such as trip gas, connection gas, and circulation gas, where that might not be so apparent over depth.
<input type="checkbox"/> C Values	Similar to the Gas Units above, this will create a series of individually-colored component-gas curves over time that follow each of the C1..C5 gases accordingly.
<input type="checkbox"/> Raw Chromatograph	This will take the Chromatograph Curve over time, and will like all of the corresponding peaks on their side, over and over again as they pertain to each individual run through the Bloodhound's on-board Chromatograph.
<input checked="" type="checkbox"/> O ₂	Charts Oxygen over time on the right-hand chart as a blue line.
<input checked="" type="checkbox"/> CO ₂	Carbon Dioxide over time on the right-hand side of the chart.
<input type="checkbox"/> H ₂ S	Hydrogen Sulfide over time, as an orange line, on the right-hand chart.
<input type="checkbox"/> Peak Tags	Any detected peak total gas will be labeled with a number denoting the Gas Units detected at the time.
<input type="checkbox"/> Edited Geolograph	Edits over time of the Golograph.
<input type="checkbox"/> Raw Geolograph	Un-edited Geolograph Input
<input type="checkbox"/> Off Bottom	Shows an orange band on the left side of the right chart over time that the bit was detected as off bottom (a.k.a., Bit Depth" < "Hole Depth).

<input type="checkbox"/> Pumps On / Off	Shows a cyan band on the left side of the right chart over time that denotes times when pumps were off (a.k.a. The sum of data coming from WITS channels 0123, 0124, and 0125 <= zero).
<input type="checkbox"/> Weight On Bit	Direct translation from the Weight on Bit value coming from WITS.
<input type="checkbox"/> Standpipe Pressure	Direct translation from the Standpipe Pressure value coming from WITS.
<input type="checkbox"/> Rotary RPM	Direct translation from the Rotary RPM value coming from WITS.
<input type="checkbox"/> Total Mud Volume	Direct translation from the Total Mud Volume value coming from WITS.

6.4.2 CHART ITEMS – DEPTH-BASED (LEFT SIDE)

In the bottom part of the box containing the time-based Chart Items (see CHART ITEMS (TIME-BASED)” above), there is a divider line below which are four values that are optionally charted on the left-hand side of the main chart, or the “depth-based chart” (see figure below). These range from “ROP” to “ROP Smooth”.

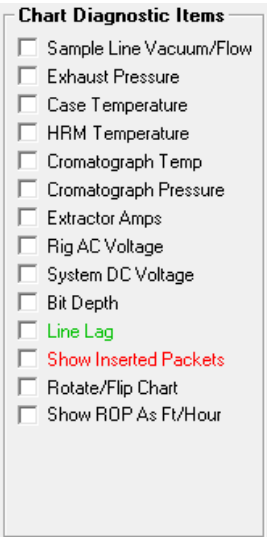
The table below identifies and describes each of these optional items to chart, respectively:

ITEM	DESCRIPTION
<input checked="" type="checkbox"/> ROP	Displayed as a black line, this is generally a stepped value over time denoting the ROP for a given foot or depth section of data.

<input checked="" type="checkbox"/> Laged Gas Units	<p>This shows the gas-units as lagged, and matched up to actual footage.</p> <p>NOTE: Since mud that is down-hole still contains lagged gas, by design, Gas Chart displays the most recent part of this curve as zero at the origin (left side) of the chart until the hole and surface line lag have elapsed.</p>
<input type="checkbox"/> Laged Gamma	<p>This is a direct translation of the “Lagged Gamma channel as sent to the Bloodhound via a WITS system.</p>
<input type="checkbox"/> ROP Smooth	<p>In cases where information packets may be dropped between the Bloodhound and Gas Chart this option will average the curve, forcing it to show more realistic character by making interpolations of missing data based on bracketing data.</p>

6.4.3 CHART DIAGNOSTIC ITEMS

This set of optional charting items may be the single most powerful section of Gas Chart that one can master. Knowing this section, and gaining an overall understanding of the interrelationships among the data herein is the equivalent of the ability to manually fly a plane on instrumentation only. It is the difference between novice and Guru. Essentially, charting these items will generate curves over time that can identify flaws in mud, drilling operations, rig-up, and the Bloodhound instrument itself.




The table below illustrates each of these items and what they chart as well as a number of contextual notes that can shorten the learning curve and help these items become more valuable in a well-logging operation:

ITEM	DESCRIPTION
<input type="checkbox"/> Sample Line Vacuum/Flow	<p>Shown over time, checking this item will display two different pieces of data at once: 1) The vacuum being drawn in the system between (presumably) the trap and the Bloodhound as a blue line, and 2) the flow-rate in litres-per-hour (LPH) as a green line. Whenever one suspects leaks, cuts, or partial blockages in a rig-up this is a very valuable item to chart. The relationship between these two is important when diagnosing apparatus-related issues. For example, knowing that if your vacuum line says it’s blocked, but the flow rate is not showing zero could mean there</p>

	<p>is a required re-calibration of either the vacuum sensor or flow meter (both easy tasks).</p> <p>NOTE: Of the many, a few specific situations this can identify: 1) Cut in sample line, 2) partial leak in sample line, 3) partially-blocked sample line, 3) fully-blocked sample line, 4) mud-level changes.</p>
<input type="checkbox"/> Exhaust Pressure	<p>In Standard Bloodhounds this is indeed the outgoing exhaust pressure, and can be used to diagnose (as an example) ice blocking the exhaust line. In Enhanced Bloodhounds (Bloodhounds whose serial number starts with a five), this is a barometric pressure reference point. In this case, it can be used (when zooming out on the chart with this item drawn) whether a weather system may have changed your peak-timing within the chromatograph.</p>
<input type="checkbox"/> Case Temperature	<p>This measures the temperature within the Bloodhound's actual large-black plastic case. It can be used to diagnose changes in temperature that may be translating to your total gas curve, or that may warrant changes to chromatograph peak timing.</p>
<input type="checkbox"/> HRM Temperature	<p>The HRM (Hotwire Replacement Module) is the red block inside the Bloodhound that contains the actual sensor array. This device's temperature should be managed to as flat a curve as possible in order to preserve reference points and keep the readings level. Charting this value along with the Case Temperature (above) can show rises and falls in the ambient (outdoor temperature) and how they impact the Bloodhound's readings. They</p>

	can show poor HVAC control of the environmental temperature where the Bloodhound is stationed, and can help in diagnosing problems with the identification of C-Values over time.
<input type="checkbox"/> Chromatograph Temp	This charts the temperature of the Chromatograph column itself. This should be flat. If there is a fluctuating curve you will need to call Tech Support for assistance.
<input type="checkbox"/> Chromatograph Pressure	This charts the pressure generated in the chromate via the chromatograph pump. If one receives a “Low Chromatograph Pressure” alarm, the first thing to do is to check this value, and over time. A *true* pump failure drops out completely, at shorter intervals with longer incidents over time. If this suddenly drops, it would be best to check internal connections to make sure no hoses came loose (very rare). If it's just hovering, or falling and rising, checking the chromatograph runs (100 G.U. minimum to get a good result) combined with this value may yield that either a barometric pressure event, or a high-altitude could be the culprit, in which case a simple adjustment of the alarm threshold may be in order.
<input type="checkbox"/> Extractor Amps	This measures the amperage which is being drawn from the Bloodhound's power supply via the 12-volt DC output on the side of the Bloodhound. When troubleshooting either an extractor or the power lines between the Bloodhound and the extractor, there are a few things this might denote. Amperage of zero might indicate a cut through the line as no amps would be drawn when the circuit is not

	<p>complete. A high amperage might indicate a dead short in the power lines, a weak connection in the line (in which case it has to push harder), or a problem with the extractor motor itself (in which case one would cut about a 3' line, and bring the extractor motor to the trailer to test directly on the Bloodhound).</p> <p>NOTE: This only applies if you are using the external power port on the Bloodhound to power an extractor, or other device.</p>
<input type="checkbox"/> Rig AC Voltage	This charts the voltage being supplied to the Bloodhound by the AC outlet into which it is plugged. This is useful in identifying problems with on-site generators, and/or wiring. In many cases, it helps when explaining that power outages were the cause of peripheral logging problems on-site since the Bloodhound will remain running during outages via its internal power source.
<input type="checkbox"/> System DC Voltage	This tracks the DC voltage provided to the circuits within the Bloodhound by its own power supply. This is useful in both demonstrating that the isolated power to the Bloodhound remains steady even when A/C power is poor (see above), and when diagnosing any internal electrical problems on the Bloodhound, although extremely rare.
<input type="checkbox"/> Bit Depth	This tracks the bit-depth over time, as provided by WITS.
<input type="checkbox"/> Line Lag	This will track the line lag over time.
<input type="checkbox"/> Show Inserted Packets	This shows any packets inserted over time.
<input type="checkbox"/> Rotate/Flip Chart	This is provided to allow for either a paper chart style of logging (more common a number of years ago) where the newest data comes in

	at the “top” of the chart. Checking this item (the default) is a more contemporary approach since it follows the bit down into the hole by showing the newest data at the bottom while pushing the overall chart upward on the screen.
 Show ROP As Ft/Hour	This changes the chart method of ROP on the left chart, from the default of minutes-per-foot to feet-per-hour.

6.4.4 CHART OIL INDICATOR

There are four known oil indicators, any of which are selectable (along with none) to allow Gas Chart to draw a line on the chart indicating the potential presence of petroleum. These formulas are spelled out neatly within Gas Chart and identified by brand so that selecting them is a breeze (see figure below).

Chart Oil Indicator

☒ None

☐ Common Oil Indicator
$$(C3 + IC4 + NC4) / C1$$

☐ Baroid Oil Indicator
$$(C1 + C2) / (C3 + IC4 + NC4)$$

☐ Shell Method Oil Indicator
$$\left(\frac{C2 + C3 + IC4 + NC4}{C1 + C2 + C3 + IC4 + NC4} \right) 100$$

☐ Pixlar Oil Indicator
$$(IC4 + NC4) / C3$$

6.4.5 CHART WITS ITEM

This section specifies any of one specific WITS items that can be arbitrarily charted in the time-based portion of the chart (see picture below). To enact this feature, select which WITS item you want to chart (Total Strokes Per Min, Total Strokes, Inclination, Azimuth, Gamma), and check the Chart WITS Item box, then wait for the chart to re-draw.

Chart WITS Item

☐ Chart WITS Item

☒ Total Strokes Per Min

☐ Total Strokes

☐ Inclination

☐ Azimuth

☐ Gamma



NOTE: The WITS channel has to be sent to the Bloodhound for this feature to function.

6.4.6 MONITOR CUSTOM WITS ITEMS

In this section, you can specify up to four particular items to chart directly from the WITS system which are not general present (see picture below). This is done by first entering the four-digit WITS channel that will be charted on the left, and adding a Label on the right, and can be any valid WITS channel.

Enter Custom WITS Channel Numbers And Descriptions To Store Into Database	
0117	Weight On Bit
0121	Standpipe Pressure
0120	Rotary RPM
0126	Total Mud Volume

6.4.7 CHROMATOGRAPH CHARTING MODIFIERS

This section allows one to change several of the factors upon which the chromatograph bars are based (see picture below).

- ☒ C1 Set C1 Color
- ☒ C2 Set C2 Color
- ☒ C3 Set C3 Color
- ☒ IC4 Set IC4 Color
- ☒ NC4 Set NC4 Color
- ☒ Make Lines **BOLD**

- In order to display (or not display) each C-Value, one either check or un-checks the boxes to the left of the colored C-Value accordingly. For example, if one didn't want to display heavies, they would de-select IC4 and NC4 respectively, but would leave C1, C2 and C3 selected (as related to the picture below).

C1 Gain	1.00
C2 Gain	1.00
C3 Gain	1.00
IC4 Gain	1.00
NC4 Gain	1.00

- Chromatograph values are by default setup to add up to one-hundred percent of the Total Gas number. The Gain value can be used to change this by the factor represented in the box to the right of the corresponding C-Value. For example, if Total Gas were 800 units, and C1 was showing 700 units, but you had a value of 0.50 in the box to the right of C1 Gain, the actual displayed value on the chart would be 350 units.



- Current C-Value Colors are denoted by the color of the ☒ C2 Set C2 Color text toward the right of this box. By clicking on Set CX Color (where (x) is the corresponding number of the C-Value), a dialog is presented wherein the color of the clicked C-Value can be changed.

RAW CG Visible Size

- This denotes the size (in millivolts) to which the value of Raw Chromatograph will be plotted when it's selected in the Chart Items section.

☒ Make Lines **BOLD**

- This will draw the Raw Chromatograph lines in Bold colors.

6.4.8 CHART SCALES

The Chart Scales section allows for the adjustment of the scales used to draw some of the more important lines (see picture below).

Chart Scales	
ROP Inches Per 100 ft	5
Gas Units Scale	0 to 4000
WITS Display Scale	0 to 500
Oil Indicator Scale	0 to 100
ROP Scale	0 to 10
Gamma Lag Scale	0 to 100

ROP Inches Per 100 ft :- Changes the vertical scale of the ROP graph (bottom right of the Main Screen), and may be used to control the scale of printed output.

Gas Units Scale - The iBall Instruments gas detection hardware and software cannot be pegged out - the gas detector can read 0% to 100% natural gas, and the software can display it in very innovative ways. To change the gas unit scale, the user just enters the scale desired to be viewed, e.g. 0 to 500, 0 to 10000.

WITS Display Scale - This scale is for any WITS item that is to be viewed. Selecting the WITS item to display will be described in the section Chart Control Box / Setup Box / WITS tab. The items that can be displayed include total strokes per minute, total strokes, inclination, azimuth, and gamma.

Oil Indicator Scale - Allows for the change in scale of the Oil Indicator. This is adjustable to accommodate the various formulas that can be applied.

ROP Scale - This scale permits the user to set the scale for viewing the rate of penetration. The ROP is in minutes per foot. To change the ROP scale, the user just enters the scale desired in minutes such as 0 to 10, 0 to 20.



NOTE: An Oil Indicator must be selected for the Oil Indicator Scale option to have any impact.

Gamma Lag Scale 0 to 100

- If the Bloodhound is connected to the WITS system, and the WITS system is sending lagged gamma information, this allows the user to view the collected lagged gamma data at a given scale.

6.5 BLOODHOUND

The next Setup Tab is the Bloodhound Tab. At the bottom of the Tab, the Local Ethernet Or Internet Connection Settings area allows the user to select connecting to the Bloodhound using a Local Ethernet Connection or a Remote Ethernet Connection.

Program And Equipment Setup

Alarms / Audio Auto ROP/LAG LAS/XLS Files Charting **Bloodhound** Statistics/Tally

Bloodhound Settings

Set The Depth
Debounce Timer In Seconds
Power Down Timer In Minutes
Gas Units Attenuation Percent
Depth Tick Chirp Level
Mute Timer In Minutes
High Gas Units Alarm Level
Set Job Number
Get Data From Bloodhound

Sample Gas Sensor Health: Good

Send Bloodhound Command

Send Command String

Local Ethernet Or Internet Connection Settings

☐ Use Serial/USB Connection
☒ Use Ethernet
☐ Check here if using MainLog on the USB port

Remote Bloodhound IP And Port
5681 Look Up IP/DNS
www.iballdata77.com:2610

Two Way Comm. To Bloodhound
Two Way Inactive ☐ Suppress Echo



NOTE: Gas Chart must either be set to connect Locally (USB/Serial), or via Ethernet. With an Ethernet connection, the user must be logged in with “Two-Way Active” for changes on this page to impact the Bloodhound.

6.5.1 BLOODHOUND SETTINGS

This section is used for several specific settings that can be sent to the Bloodhound via Gas Chart (see picture below).

The following table illustrates what the potential settings are:

ITEM	DESCRIPTION
<div>Set The Depth</div>	<p>Enter a specific depth (in feet) in the left panel, and click on this button to send it to the Bloodhound.</p> <p>NOTE: Avoid up-hole depth changes, or be aware that large up-hole changes may force the need for a new Job Number on the Bloodhound and a New Database in the Gas Chart software, as depth is the primary key for LAS files.</p>
<div>Debounce Timer In Seconds</div>	<p>When using a geolograph to track depth, it is often important to adapt to changes in drill rates. Entering a time in seconds here will set the Bloodhound to not become eligible for a foot tick until the number of seconds entered has elapsed.</p>

	<p>EXAMPLE: If set to ten (the default), then when a close of the contacts on the geolograph switch is detected, the bloodhound will not look for a subsequent closure until after ten seconds have elapsed.</p>
Power Down Timer In Minutes	<p>The Bloodhound will power down at this interval.</p>
Gas Units Attenuation Percent	<p>This will modify the percent of total gas read by the Bloodhound and display/send it to all subscribing applications. In short, this represents the percent of gas that the Bloodhound is allowed to display.</p> <p>EXAMPLE, if the Bloodhound is reading 1000 units, and it is desired that only 800 units show (for various reasons), then one would set this to 80 and submit it to the Bloodhound by pressing the button.</p> <p>NOTE: In this example the maximum the Bloodhound will ever display is 8000 units, because one has effectively moved the top-end of the scale in to 80% of the maximum.</p>
Depth Tick Chirp Level	<p>This will change the volume (rather the length) of the depth-tick in milliseconds so that whenever a foot is ticked off, this alarm will sound with it.</p>
Mute Timer In Minutes	<p>This will mute the Bloodhound's audible alarm for the number of minutes indicated here.</p> <p>NOTE: Sending 550 with this command will effectively mute the Bloodhound's alarm completely.</p>

	NOTE: This has no impact on alarms in the Gas Chart software, which will continue as configured.
High Gas Units Alarm Level	<p>This sets the threshold in units over which an alarm will sound alerting users nearby of a High Gas event.</p> <p>EXAMPLE: Setting this to 5000 will cause the Bloodhound to alarm audibly and show an error condition with lights that High Gas has been breached.</p> <p>NOTE: Setting this to zero will effectively disable this particular alarm.</p>
Set Job Number	<p>This will set the job number on the Bloodhound to the value entered here.</p> <p>NOTE: Best practice is to increment the job number by one whenever setting this rather than trying to mimick a site-number or similar. This number is arbitrary to the Bloodhound and its software and does not get propagated outside of those tools.</p>
Get Data From Bloodhound	<p>This will refresh all current data and populate it in the boxes on the left hand side of this section.</p> <p>NOTE: If one wants a reference point when adjusting these, it is advised to hit this button first to see where things are set before making changes.</p>

6.5.2 SAMPLE GAS SENSOR HEALTH



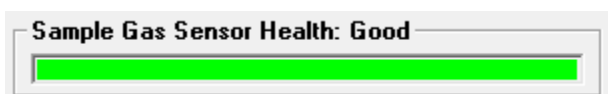
NOTE: If the Sample Gas Sensor field drops to the bottom of red and returns to green on occasion, this is normal for units with serial numbers starting with a five. That situation indicates that the



number is being

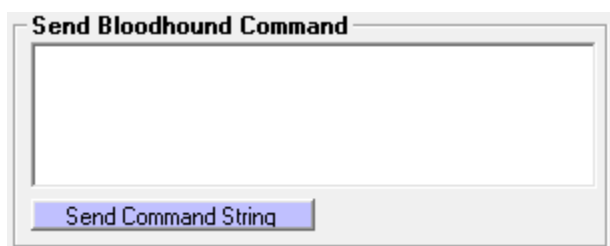
NOTE: Send Bloodhound Command is an advanced feature and CLI commands will not be specifically addressed here. They are defined in the Bloodhound hardware manual if you wish to explore this function in further detail.

In the upper-right corner of this screen is a health bar, indicating the general health of the Bloodhound's sensor (see picture below). If this bar is continually (not occasionally) yellow or below, this is an indicator that either the Bloodhound is due for service, or a call to technical support is in order.



6.5.3 SEND BLOODHOUND COMMAND

This section is used to send custom command-line-interface (CLI) to the Bloodhound via the USB or Two-Way connection (see picture below). In order to send a command, one enters the specific command in the large white field, and clicks on Send Command String.



6.5.3.1

6.5.4 LOCAL ETHERNET OR INTERNET CONNECTION SETTINGS

When Gas Chart software is being used on a computer directly connected to the Bloodhound using the USB cable you want to be sure to select the Serial/USB option (connection default).

Local Ethernet Or Internet Connection Settings

☐ Use Serial/USB Connection

☒ Use Ethernet

☐ Check here if using MainLog on the USB port

Remote Bloodhound IP And Port

5681 Look Up IP/DNS

www.iballdata77.com:2610

Two Way Comm. To Bloodhound

Two Way Inactive

☐ Suppress Echo

When Gas Chart software is being used at a location remote from the Bloodhound (running remotely), check the box next to Use Ethernet Instead of Serial Connection and type in the 4 digit number of the Bloodhound and push the Look UP IP button, and the IP and Port will be displayed in the box below. Click on the red Get Data From Bloodhound to ensure connection (See Getting Started section for detail).

If connected to the Bloodhound on a local Ethernet (through a router or computer that is running a DHCP service) check the same button as above and enter the local IP address displayed on the LCD panel of the Bloodhound (it will scroll past eventually) and use 23 as the port number: 192.168.1.7:23 (See Getting Started Section for detail).

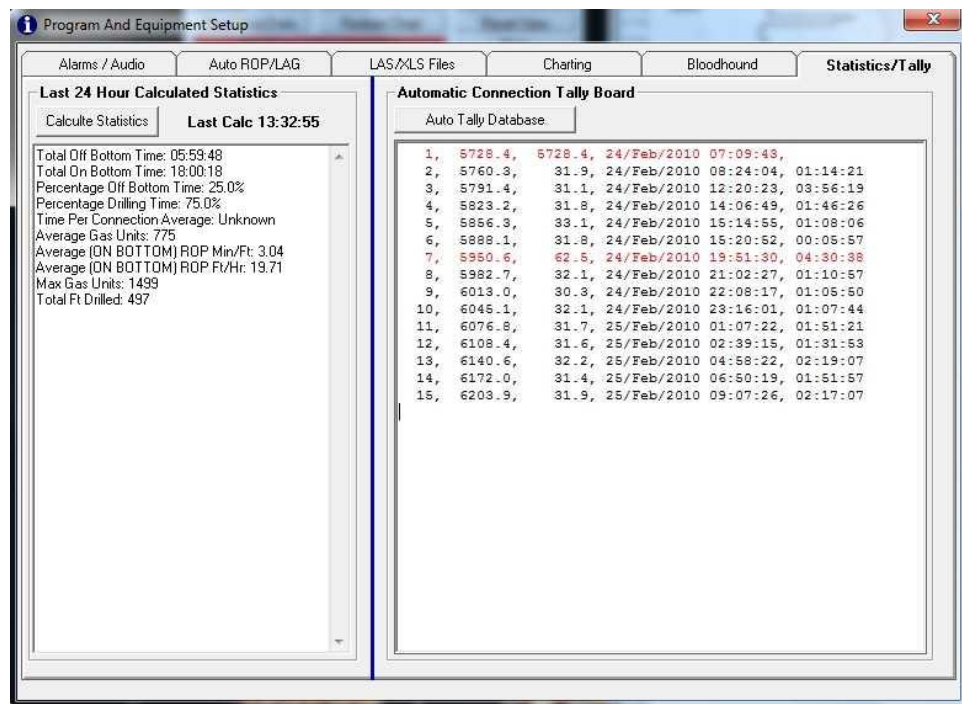
When running locally, the left section of the Bloodhound Setup Tab allows the user to read and change certain Bloodhound Settings. Pressing **Get Data From Bloodhound** will query the Bloodhound and fill in the data in the windows above. The right section allows the user to see the health of the IR sensors within the Bloodhound. The Sensor health will go from green, to yellow, and finally to red. When the bars turn to a mid yellow, it is time to replace the IR sensors.

When running locally or remotely, this setup tab also allows the user to send Bloodhound commands directly to the Bloodhound system. When connected

remotely, you must connect and wait 15 minutes until the server will allow you to send commands to the remote Bloodhound (with the proper login/password). All commands can be found in the Bloodhound user's [manual](#).

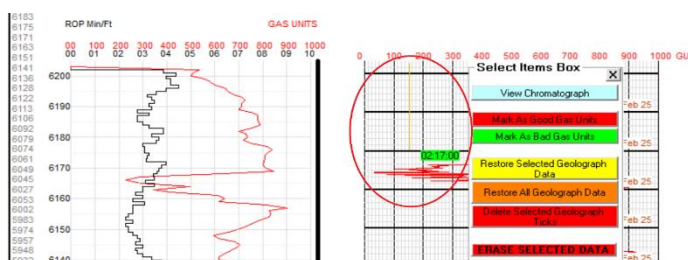
6.6 STATISTICS/TALLY

This tab allows the user to calculate the pipe tally, Total Off Bottom Time, Total On Bottom Time, Percentage Off Bottom Time, Percentage Drilling Time, Time Per Connection Average, Average Gas Units, Average On Bottom ROP Mn/Ft, Average On Bottom ROP Ft/Hr, Max Gas Units, and Total Ft Drilled from the data in the database by clicking Calculate Statistics and Auto Tally Database buttons.



7 SELECT ITEMS BOX

Double left-clicking on the right hand side of the gas chart will bring up a select tool that changes color and is stuck to the tip of the cursor. Also at the tip of the cursor is a green information box that displays the time in minutes. If the cursor goes to the left of the Geolograph tick marks, the green information box displays the depth. This is useful in selecting a range of feet or minutes of data. By double clicking on a second point as you drag down on the Gas Chart, you have just selected a range of data, and the Select Items Box will appear (as pictured below).



7.1 VIEW CHROMATOGRAPH

In all versions of the Bloodhound, the chromatography system is actually a second sub-system within the Bloodhound's core infra-red (IR) plumbing circuit. While the IR circuit continually runs and in real-time identifies the total hydrocarbon-based gas volume on a near real-time basis, the Chromatograph is a snapshot in time that is created with a short sample that is taken on the fly.

Below is a basic flowchart showing the two systems and how they connect.



The sampling mechanism is accomplished by a solenoid in the Bloodhound that opens for a few seconds to the main real-time gas line while a second pump which is dedicated to the chromatograph part of the system pulls in a sample. The solenoid then closes and the IR/real-time portion of the system continues as normal. When the solenoid switches away from the sample line, it uses fresh air from the inside of the case as a medium to push the sample through the heated chromatograph column, which is a long tube that consists of a proprietary mixture of filtering particulates. As the sample is pushed through the column, the hydrocarbons separate into their component gases in order of molecular weight from lightest to heaviest (i.e, methane, ethane, propane, butane, etc.). The gases then escape the end of the column and are run through an entirely separate chamber in the Bloodhound's sensor block where a VQ sensor picks up the hydrocarbons. When the sensor is activated it sends an electrical signal to the Bloodhound's brain board, where it is interpreted as gas. This occurs over a period of a few minutes, and when a chromat sample run is completed, the whole process starts over again with the solenoid re-opening. This process results in a chromat sample run that takes several minutes to complete and produces a chart of the component gases as parabolas in sequential order from lowest to highest molecular weight.

Using this sampling mechanism, the Bloodhound will build a percentage based model of the gas components. This model can be thought of simply as a pie chart that is used against whatever the current real-time total gas number is to break out the C-values (see image below).

Once the chromat run is completed and the model is complete as well, the Bloodhound applies to the real-time total gas numbers to approximate component gas volumes until the completion of the next chromat run.




NOTE: *The Bloodhound can identify other gases farther down the chain; however, these will not be identified and factored into the overall model. By raising the column temperature and extending the run-time, you can see these non-bold peaks form in these situations. If this is a need, the recommended procedure is to get them to appear on the Gas Chart Chromat Run screens, estimate the volume/percentage under all of the curves, and build a spreadsheet to derive partial gases from the whole using your own model. This is considered an advanced process and is not covered in detail in this manual.*

For example, if the current model says there is 75% C1, and 25% C2 (with no other component gases), and your current real-time reading on the Bloodhound shows 3000 units, then in the real-time data viewer screen you should see for C1 a total of 2250 units and for C2 a total of 750 units, and 0 units for the rest of the C Values (see image below for an example of a component gas breakout as shown about 2/3 of the way down on the real-time data screen).

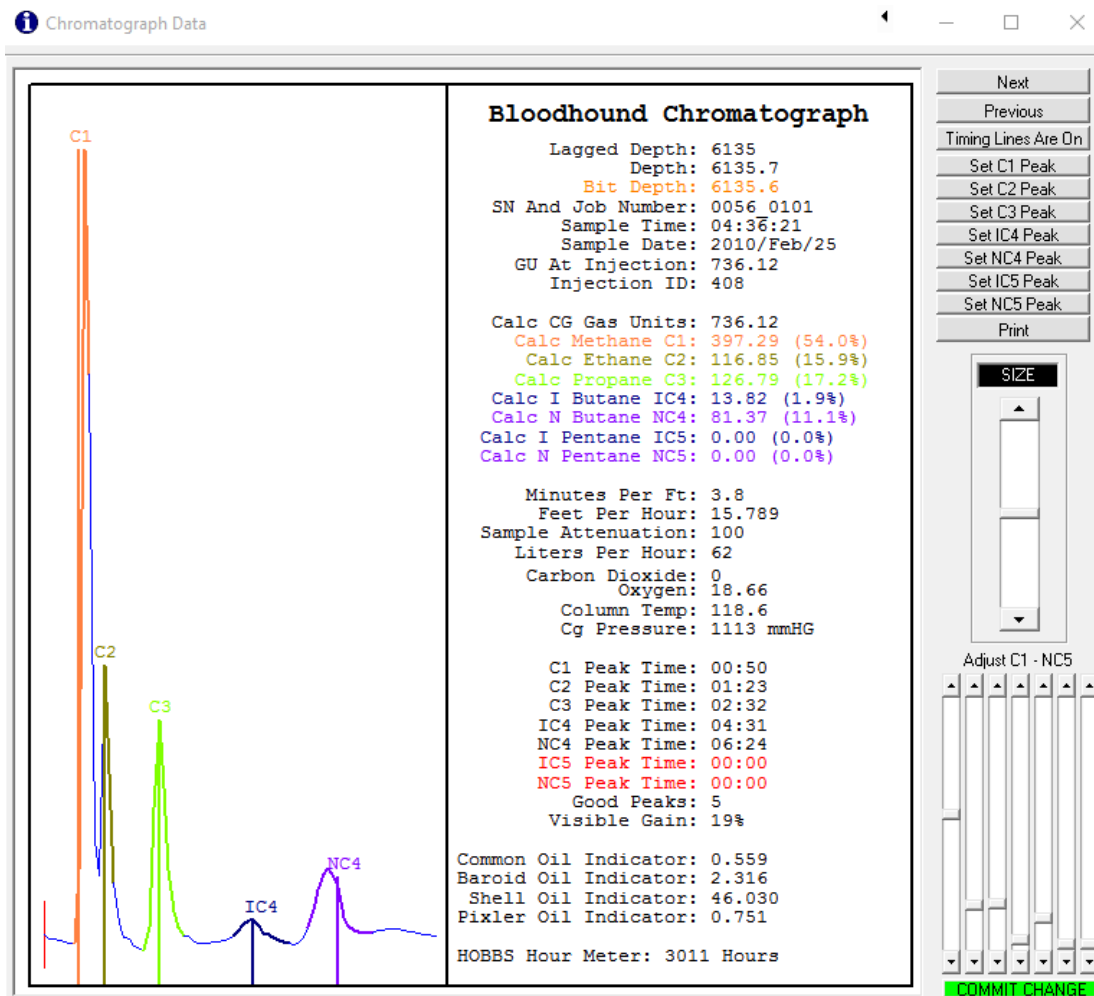


Using Gas Chart and the Bloodhound, the Bloodhound can capture, measure, and break apart C1 through NC5.

When in the Select Items box (above), clicking the  button will raise the Chromatograph Data window (as pictured below).



ADVICE: Get familiar with this page. Bring it up frequently and examine multiple chromatographs by clicking on the “Previous” and “Next” buttons respectively. Over time, this data will build a context around the types of gases detected, the relationships between voltages and peaks, impacts of weather and altitude on gas measurement, and condensates in the mud. Understanding chromatograph charts and elution timing is a very useful and marketable skill.



This button allows the user to see a close-up view of the selected chromatograph output. Left clicking and holding on the chromatogram will allow the user to adjust the trace up and down on the display window. If the trace is too large or too small, the user can adjust the over all visual size in the Program and Equipment Setup Screen, under the Chromatograph Tab. When the user is satisfied with the display, a print can be made of the chromatogram.

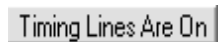
The LEFT side of the Chromatograph Data window shows the chromatograph peaks, specifically the elution time. The peak search times (elution times) are shown as heavy-colored overlays on the chromatograph curve. Each time-window is centered on its associated vertical line, which is the “picked Peak” time in seconds before and after the line setting. This is a time window in which the Bloodhound will search for the “real” peak and establish a volume under the parabola (i.e. peak) that will be used to create a model of the gas mix. The width of the time windows is controlled by Bloodhound C Value Standard Deviation Register 61 through 65 (see the Bloodhound manual for register list).

The data for the particular chromatogram is available on the RIGHT side of Chromatograph Data window. If a particular peak timing is off, or is incorrectly labeled, then all the user has to do is click on the corresponding Set C(x) peak button, place the cross hairs over the correct peak, and DOUBLE CLICK on the peak to set the new elution timing window for that component (please refer to www.bhkb.org for the “How To” article on setting peaks).

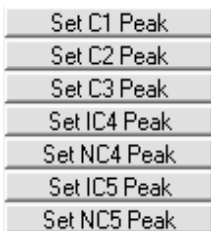
7.1.1 PREVIOUS / NEXT BUTTONS

 To see the
Figure 13 – Chromatograph Data Window

7.1.2 TIMING LINES BUTTON

 - Using this button will toggle the peak vertical lines On and Off as needed. This can be very helpful when setting your peak timing.

7.1.3 SET C VALUE PEAK BUTTONS



- Use these buttons to Set each C Value peak. Click the C Value button, then on the LEFT side of the Chromatograph windows **DOUBLE-CLICK** to set the timing vertical line and wait for the timing confirmation window to complete.

7.1.4 PRINT BUTTON



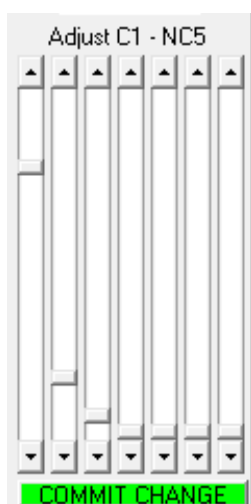
- Chromatogram print if there is an available printer setup on the PC that Gas Chart is running on.

7.1.5 VISIBLE GAIN SLIDER



- This slider will adjust the Visible Gain on the peaks displayed on the LEFT side of the Chromatograph Data Windows.

7.1.6 ADJUST C VALUE % SLIDERS



- These sliders allow retroactive modifications to chromat runs. It does not change peak timing, rather it changes the percentage that was output for a particular injection (i.e. chromat run).

7.2 DATABASE MARKING



- Select a questionable range of data as you would to view a chromatograph, and then click on Mark As Bad Gas Units to change that range of GU to green. To reverse the process, select the same area and click on Mark As Good Gas Units to change GU back to the original color.

7.3 GEOLOGRAPH SELECT DATA RESTORE

A yellow rectangular button with a black border containing the text "Restore Selected Geograph Data".

- This button will restore any Geograph data that has been previously deleted or changed in the range that was selected. To see the difference, select the Raw Geograph check box in Setup on the Charting Tab and then CLICK Redraw Chart from the Control Box.

7.4 GEOLOGRAPH ALL DATA RESTORE

An orange rectangular button with a black border containing the text "Restore All Geograph Data".

- This button restores all the Geograph data from the start of the database to the end. Any changes that have been made will be undone.

7.5 GEOLOGRAPH TICKS DELETE

A red rectangular button with a black border containing the text "Delete Selected Geograph Ticks".

- This will remove the blue Geograph tick marks from the database. To see the difference between the blue edited Geograph tick marks and the Raw Geograph tick marks, just check either the Raw or Edited tick marks box of the Gas Chart Control Box, Charting Tab.

7.6 DATABASE DATA ERASE

ERASE SELECTED DATA

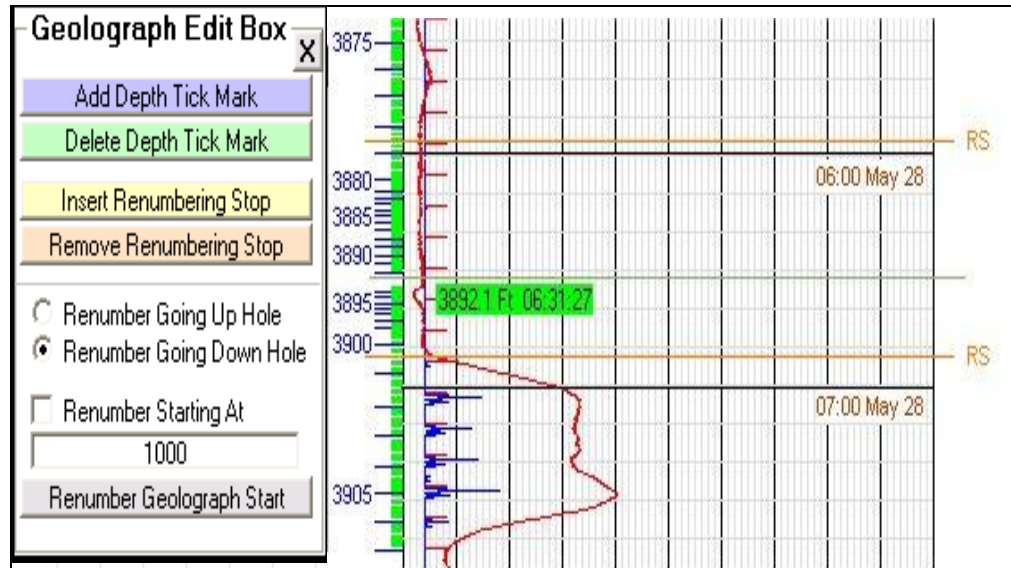
- This button will erase all of the selected data from the database. The program will then perform a database check and then re-index the database.

8 GEOLOGRAPH EDIT BOX

The Gas Chart program has the ability to edit the Geolograph tick marks on a one-by-one basis. To change the edited Geolograph data the user must move the mouse over the Geolograph tick marks, and hold down the right mouse button. When moving the cursor over the Geolograph tick marks, it will turn into a Double-Headed arrow or Up/Down arrow cursor (as pictured below):



This will bring up the Geolograph Edit Select Tool and the Geolograph Edit Box. The Select tool is a blinking horizontal line that will follow the mouse up and down while the right mouse button is held down. There is also a green data box that follows the line that indicates a depth and time that the mouse is pointing to in the database. While holding down the right mouse button and moving the mouse up and down, the user will be able to select a specific point in the database that the user will be able to edit.



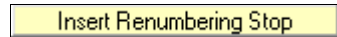
8.1 ADD DEPTH TICK MARK

Add Depth Tick Mark - This will insert a non-numbered foot tick. This inserted foot tick is not numbered and will be red in color with a red NF (New Foot) next to it. These new foot ticks are intended to be renumbered by the user at a later time.

8.2 DELETE DEPTH TICK MARK

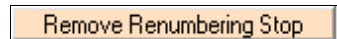
Delete Depth Tick Mark - This will remove a single foot tick from the database. This foot tick can be a blue edited foot tick or a red NF foot tick. It will always remove the nearest foot tick to the horizontal selection tool.

8.3 INSERT RENUMBERING STOP



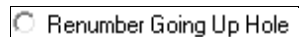
- If the user just wants to renumber within a set of boundaries, then the user has the ability to enter into the database a single or multiple renumbering stop(s). Renumbering stops allow the user to control where the renumbering will take place. The insert renumbering stop button will allow the user to insert as many renumbering stops as needed to control the renumbering of the Geolograph.

8.4 REMOVE RENUMBERING STOP



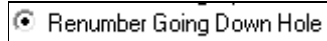
- This will remove the nearest renumbering stop to the horizontal select tool.

8.5 RENUMBER GOING UP HOLE



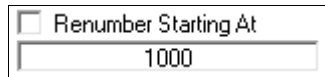
- This button tells the charting program to renumber from the horizontal select tool moving up towards the top of the hole.

8.6 RENUMBER GONG DOWN HOLE



- This button tells the charting program to renumber from the horizontal select tool moving down towards the bottom of the hole.

8.7 RENUMBER STARTING AT



- If the user wishes to change the renumbering numbers, then the user should enter the number that the renumbering will start at. This will start the renumbering at a new number and continue up or down until the end of the database or a renumbering stop is seen.

8.8 RENUMBER GEOLOGRAPH START



- This button will tell the charting program to begin renumbering the database with the given parameters.

9 APPENDIX A – GLOSSARY OF TERMS

ASCII	American Standard Code for Information Interchange
Browser	A program used to view HTML documents (i.e. Internet Explorer, FireFox, Chrome)
CG	Chromatograph
CO₂	Carbon Dioxide
DB	Database
H₂S	Hydrogen Sulfide
I/O Port	Input/Output Ports
I/R	Infra Red
IDB	iBall Database file extension. This is the file extension of the raw data saved to the Bloodhounds USB jump drive.
LAS	Logical ASCII Standard File protocol (File Extension compatible with EXCEL & Notepad)
LPH	Liters Per Hour
MDB	Microsoft Database (Used with Microsoft ACCESS and EXCEL)
mmHG	Millimeters of Mercury (unit of pressure defined as 1/760 of an atmosphere)
O₂	Oxygen
PC	Personal Computer
ROP	Rate of Penetration
TCP	transmission control protocol: a protocol developed for the internet to get data from one network device to another
TG	Total Gas
USB	Universal Serial Bus (USB) is a serial bus standard to interface devices
WITS	Wellsite Information Transfer Specification
XLS	Filename Extension (Microsoft Excel spreadsheet file)

10 APPENDIX B – ALARM CODES/DESCRIPTIONS

Condition	Alarm Number	Bloodhound Register Setting
Unknown Alarm	0	Hours meter
High Sample Line Pressure	1	
Blocked Sample Line	2	Reg 52: factory setting 200 (means -200 mmHg)
Detector Voltage High	3	No register setting - Automatic from HRM
Detector Voltage Low	4	No register setting - Automatic from HRM
High Flow Rate	5	Reg 50: factory setting 200 LPH
Low Flow Rate	6	Reg 51: factory setting 20 LPH
Low Power Voltage	7	Set at 11.1 VDC No register setting
High Amps going out to 12V Cavitator terminals (60 second average)	9	Reg 37: factory setting 5 Set to 0 to disable
High Temperature inside Case	10	Reg 46: factory setting 120 degrees F
Low Temperature inside Case	11	Reg 47: factory setting 35 degrees F
High Gas Units	12	Reg 53: factory setting 22 (means 2200 units) Set to 0 to disable
HRM Warming Up	13	
Unit In Shutdown Mode	14	No register settings
Geolograph Switch Noise	15	Reg 33: factory setting 180 spikes

		Set to 0 to disable
CG Low Pressure	16	Reg 54: factory setting 70 (means 700 mmHg) Set to 0 to disable
High H2S		Reg 56: factory setting 50 Can set from 0 to 200 Set to 0 to disable
Exhaust Blocked (high ex prs)		Set to 50 mmHg - No register setting