

Bird Dog II System

Geophone Test Unit



User's Manual

Bird Dog II System User's Manual

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1 Introduction

1.1 System Description

The Bird Dog II system is an independent analog to digital acquisition system, especially designed for quality control testing and repair of seismic geophone units and geophone strings.

The Bird Dog II System consists of the following:

- DAQLink Unit Digital to Analog converter unit with Ethernet interface. DAQLink-II is a 24 bit acquisition unit, with each box containing up to 24 channels. The Bird Dog II requires only 2 channels. The Bird Dog II also uses the 16 bit D/A output of the DAQLink II unit.
- Computer The DAQ Link unit connects to a computer with Windows 98, Windows XP, Windows NT or Windows 2000 operating system and an Ethernet Network Interface Card (NIC).
- Bird Dog II software operates on the computer and communicates to the DAQ Link unit. The Software package allows viewing, analysis, and storage of the acquired signals.
- Connection cables are included to connect:
 - Power (11-18 VDC)
 - Geophone being tested
 - Leakage cable to test leakage of geophone string
 - Ethernet cable to connect DAQLink II to computer

1.2 Bird Dog Software Installation and Setup

Create a new directory on the hard drive and copy all files from installation CD to that directory

• GeoTest.exe – Geophone Test program used to analyze and store the geophone test signals and results.

1.3 GeoTest version 2.68 and newer

To operate the GeoTest program requires:

- GeoTest.exe this main executable program
- GoIO_DLL.dll this is used with optional temperature sensor, and is required
- Minus.wav wav files for Polarity TAP tests
- Plus.wav
- Tap.wav

The *.wav files can be changed to a different language or sound. These files must have the minus.wav, plus.wav, and tap.wav names to be used by the program.

After running GeoTest the program directory should look as follows:

Size
4,920 KB
244 KB
130 KB
87 KB
87 KB
1 KB

2 Ethernet Setup

When computer is not connected to a local area network (LAN) it is necessary to set up a fixed TCP/IP address for the computer to communicate with the DAQLink II unit.

With Windows XP computer this can be done by the following procedure:

Go to the Control Panel Window



Figure 2.1 Control Panel

😼 Control P	anel								_	
File Edit	View Favorite	es Tools He	lp							-
🕞 Back 🔹	🕤 - 🍺	🔎 Search	6 Folders		× 9					
Address 🔂	Control Panel								_ _ E	Go
Ġ,	Ŵ	6	-	2	P	<u>s</u>	۷	I		
Accessibility Options	Add Hardware	Add or Remov	Administrative Tools	Automatic Updates	Date and Time	Display	Firebird 2.0 Server M	Folder Options	Fonts	
~	9	٢	1	٩	C		6	<u>i</u>		
Game Controllers	Internet Options	Java	Keyboard	Mail	Mouse	Network Connections	Network Setup Wizard	Nokia Connecti	Phone and Modem	
	4			3	1		nects to other c	omputers, netwo	orks, and the I	nternet.
Portable Med Devices	ia Power Options	Printers and Faxes	Regional and Language	Scanners and Cameras	Scheduled Tasks	Security Center	SigmaTel Audio	Sounds and Audio Devices	Speech	
3		<u>8</u> 2								
System	Taskbar and Start Menu	User Accounts	Windows Firewall	Wireless Network Set						

Double Click on an icon that corresponds to your network connections



Figure 2.2 Network Connections

Right Click on the Local Area Connection Icon and select Properties



Local Area Connection Properties	×
General Advanced	_
Connect using:	
Marvell Yukon 88E8053 PCI-E Gigabi Configure	
This connection uses the following items:	
🗹 📮 QoS Packet Scheduler 📃	
✓ The Network Monitor Driver	
🗹 🀨 Internet Protocol (TCP/IP)	
Install Uninstall Properties	
Install Uninstall Properties	
Install Uninstall Properties Description Transmission Control Protocol /Internet Protocol. The default	
Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication	
Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.	
Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.	
Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. Show icon in notification area when connected	
Install Uninstall Properties Install Uninstall Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. Show icon in notification area when connected Image: Notify me when this connection has limited or no connectivity	
Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. Show icon in notification area when connected Notify me when this connection has limited or no connectivity	
Install Uninstall Properties Install Uninstall Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. Show icon in notification area when connected Show icon in notification area when connected Notify me when this connection has limited or no connectivity	
Install Uninstall Properties Description Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks. Show icon in notification area when connected Notify me when this connection has limited or no connectivity OK Cancel	

Select Internet Protocol (TCP/IP) and click on Properties button. Use following IP address: IP address 192.168.0.101 Subnet Mask 255.255.255.0 Press OK to accept entries.

Internet Protocol (TCP/IP) Propertie	s ? X
General	
You can get IP settings assigned autom this capability. Otherwise, you need to a the appropriate IP settings.	atically if your network supports isk your network administrator for
O Obtain an IP address automatical	y I
☐ Use the following IP address: —	
IP address:	192.168.0.101
Subnet mask:	255.255.255.0
Default gateway:	· · ·
C Obtain DNS server address autor	natically
☐ Use the following DNS server add	
Preferred DNS server:	· · ·
Alternate DNS server:	· · ·
	Advanced
	OK Cancel

Select the Advance settings of the Local Area Connections Properties and disable the Windows Firewall

L. Wireless Network Connection Properties	🗙 🎯 Windows Firewall 🛛 🔀
General Advanced	General Exceptions Advanced
Windows Firewall	Your PC is not protected: turn on Windows Firewall
Protect my computer and network by limiting Settings or preventing access to this computer from the Internet	Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
Internet Connection Sharing	😧 On (recommended)
Allow other network users to connect through this computer's Internet connection	This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Allow other network users to control or disable the shared Internet connection	Don't allow exceptions
Learn more about <u>Internet Connection</u> Settings	Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
	© Off (not recommended)
If you're not sure how to set these properties, use the <u>Network Setup Wizard</u> instead.	Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
OK Cancel	
	What else should I know about Windows Firewall?
	OK Cancel

All other Networks should be disabled except for the Local Area Network.

SNetwork Connections		
File Edit View Favorites Tools Adva	anced Help	n
🚱 Back 🝷 🕥 👻 🏂 🔎 Search 🛛	🄁 Folders 🛛 🔯 🏂	× 🍤 💷 -
Address 🔕 Network Connections		💌 🔁 Go
Name	Туре	Status
Internet Gateway		
SInternet Connection	Internet Gateway	Connected
LAN or High-Speed Internet		
Local Area Connection	LAN or High-Speed Inter	Connected
^{((P))} Wireless Network Connection	LAN or High-Speed Inter	Disabled
🕹 1394 Connection	LAN or High-Speed Inter	Disabled
Wizard		
💽 New Connection Wizard	Wizard	
🔮 Network Setup Wizard	Wizard	
•		Þ

It is sometimes necessary to reboot the computer to have the new address take affect.

Also if the DAQLink II unit was previously communicating with a computer with a different address, then the DAQLink II unit must be reset (power off then on) for the unit to communicate to the new address.

With some of the Windows versions there is an additional Authentication Tab. The Authentication must be disabled to operate with the DAQLink unit.

To verify that the IP address is correct, select "Start", then "Run", then type in "CMD". This starts the command prompt in Windows (This is similar to the old DOS command prompt). Type the command "ipconfig". The current IP address 192.168.0.101 should be shown.

3 Cable Connections

3.1 Bird Dog Cable Connections

- Connect DAQ Link to computer with patch cable provided
- Connect 11-18 VDC supply to DAQ Link power cable (polarity does not matter). The power connects to the 2 pin connector on the DAQlink unit. Make sure voltage to box is at least 11 volts. The power LED will operate with lower voltage but the unit will not perform properly.
- Connect the standard geophone test cable. Connect the 55 pin circular connector to the DAQLink II unit, connect the geophone test clips to the geophone under test.
- The leakage test requires that a 200 kOhm resistor be placed across the "geophone test clips". The geophone string needs to be connected to the red geophone test clip and the black geophone test clip needs to be connected to the water in the leakage test chamber.

4 Configuring The Program

4.1 Hardware Configuration

Connect and power up DAQ Link unit. Start the Bird Dog II program by double clicking on GeoTest.exe file in Windows Explorer. Verify the correct DAQ Link unit is enabled by selecting menu **Settings->Device**.

If no unit serial numbers are displayed in the window click Auto Detect. It should find all DAQLink units connected to computer.

Make sure the unit is enabled. A check mark by the serial number shows that the unit is enabled. Just left click the small box next to the serial number to enable it. This feature allows multiple units to be connected through the Ethernet link. All that is needed is an Ethernet hub.

Verify that Reference and Geophone1 are selected in the Channels selection.

🔮 GeoTest										
	BirdDog	II Geophone	Test	Seis	smic Se	ource (ю.	Co	pyright 2	001-2005
🖌 Test	Single	Serial Par	allel	Units	l cm		Store Raw	Signal	Date: 2	1.02.2006
🔎 Scope	suring							olgi la	-	
🛄 Database	Geophone set	ungs 1	Abe les-and			New		Auto fill spe	ecification	
Settings	Coil Resistance Moving Mass (N	DAQ Setup						X p, V/cr /cm/s	n/s))	0.275
🕜 Help	Drive Frequency	Enable D DAQ 136	AQ Name	Seria 136	#		<u>A</u> dd	Ohm)		284
Califican	Shunt Resistor	Confie	uration		X	ſ	Remove	Ohm)		658.8
Current Database	Natural Frequer	Cha	nnel	Number	7			cm p	top)	0.152
Main DB	Shunted Damnit	Refer	ence	1	•	6	Auto Detec	<u>1</u>		125
Database		Geop	hone1	2	2				-	
Controls	Туре	Geop	hone2	3		6	Channels	vicmis	Rcs, Ohn	Zts, 0 🔺
Hardware	GS-30CT	Geop	hone4			i i	IP Setting	197	284	658
Device	GS-32CT GS-20DX	Geop	hone5	6				2 197	284	658
Tolerance	UltraPh2-3W					. . .	OK	275	395	1400
Upload Test Signal	L-210 SM-4/U-B10Hz	370			57	0.67	0.195	0.195	370	1151
	L-25D-30Hz	710 8.4	30 432	2 30	0.2695	0.711	0.3992	0.151	269	37(
										~
	<		_		_	-				>
Default Settings			Sa	ve Geophon	e		Delete Geo	phone		
Rx 🕼 Tx 🚱									Versie	n 2.24 b

Click OK. Settings will be stored in the device memory.

Figure 4.1 Device Configuration

To check that communication with the DAQLink unit is working properly click the menu **Settings->Device**, then IP Settings button. The device information should appear. If the configuration window does not appear, it means that the DAQLink unit selected is not responding.

Device Properties		
DAQ name: DAQ 141 DAQ number: 141 ADC Resolution: 24 bit Network Interface vers Release date: 9/27/20 DSP Firmware version: Release date: 12/23/2	ion: 4.34 105 4.38 1005	
DAQ IP address sh	ould be DIFFEREN	T from computer IP address.
IP Address	192.168.0.128	Andr
Net Mask	255.255.255.0	Арріу
Use DHCP serve	er to configure IP	Close

Figure 4.2 Device IP Settings

This is usually caused by improper TCP/IP settings, or Ethernet cable not plugged in properly. The computer or DAQLink unit may need to be reset if the TCP/IP configuration has changed.

The first three numbers in IP Address of DAQLink unit should match your computer IP Address (192.168.0.). The last number must be different. It should be in the range from 1 to 253. If your computer uses 101 as the last number in its IP Address then you CANNOT use 101 for the DAQLink.

Do not change DAQLink IP Address unless you have some other device connected to network with the same address. Programming wrong IP Address to the DAQLink may cause it to stop communicating with computer.

An additional check of communication can be performed by first removing all DAQ units from the table. Highlight the DAQ unit to be removed then press the Remove button. After all units have been removed, press the Auto Detect button and all units connected to the computer will be added.

Once the unit is setup, there is no reason to return to this menu unless you need to change DAQLink unit or test the communication link.

4.2 Calibrating Bird Dog II unit

The Bird Dog II unit allows the end user to calibrate the unit to allow for tolerance of the internal components in the unit. First measure the resistance of the geophone under test with an accurate digital Ohm meter, then perform a resistance test with the GeoTest program. If the values are within 3% then no adjustment should be made. (Most Digital Ohm meters are not accurate to over 3%). If you feel the Geo Test Program is reporting too high or too low resistance, then the Calibration Resistor (R25) can be adjusted to compensate for the inaccuracy. Go to the Hardware Setup menu in the GeoTest program. Select **Settings –> Hardware**

Settings	×
Hardware settings Date: 2.	/27/2006
Calibration Resistor R25 (Typical 612 Ohm)	612
R26 (Typical 10,000 Ohm)	10000
Leakage Fixed Resistor (Typical 200,000 Ohm)	200000
Distortion Driving Velocity (Typiacal 1.8 cm/sec)	1.78
Polarity Trigger Level (Volts, 0 - Auto)	0
Drive Low Drive Z (% of normal Drive)	20
Pulse Drive (Typical 70)	70
Distortion Correction Factor (Computed)	
Voice (Requires Tap, Plus, Minus.wav)	
OK Cancel	

Figure 4.3 Hardware Setup

The Hardware setup allows fine-tuning of the Bird Dog II test results. The internal constant current source uses an internal (R25) 612 ohm resistor. To check if the entry for the internal resistor needs calibration, test the resistance of a known resistor. Adjust the entry for R25 to calibrate the resistor measurement to be exact.

4.3 Lock Feature

There is also a "lock" feature in the program. This allows the technician to "lock out" the critical entries of the program for unskilled operators.

Just click the "lock" button in the setting menus to "lock" the menus.

To "Unlock" the menus, enter the password "ssc"

Labor Diat	01-06	300	0,4	12	U
Label Print	UltraPh2-3W	395	8.4	12	0
Font Size 10	di ara	070		20	-
_	Enter password	d			
Width 65 Height 25	Password				
Security	Issd				
Unlock Menus		ОК) [(ancel	
			22 22		- 22

5 Program Operation

The main menu of the program is located at the left side of the program window. It allows you to navigate between various operation modes. They are Test Mode, Scope Mode, Database Mode and Settings Mode. There is an additional menu in the left bottom corner. It corresponds to current operation mode.



5.1.1 Database Menu



The **Settings -> Database Tools** menu allows the user to Create, Rename, Empty, or Delete the database. Bird Dog II can use different databases to store acquired data. The projects are like folders used to sort and store different data. The program remembers last project and loads it automatically on startup.

Database Tools	
Name Main DB	
Path C:\BirdDog\20)05_Vyacheslav\GeoTe 🥃
Databases	
Main DB	Create Database
	Rename Database
	Empty Database
	Delete Database
	OK Cancel

Figure 5.1 File Menu

To Create new Database, first enter new name in the name field, and then press the "Create database" button.

All of the different databases will be shown in the database list.

🔇 Database Tools	
Name Main DB	
Path C:\BirdDog\2	005_Vyacheslav\GeoTe 🛃
Databases	
Main DB	Create Database
New Database	Rename Database
	Empty Database
-	Delete Database
	OK Cancel

The above example shows two databases; Main DB, and New Database. Click the database to be used, and the program will switch to that database.

5.1.2 Hardware Setup

Hardware

The Hardware Setup menu is accessed using the menu **Settings -> Hardware**. The Hardware setup allows fine tuning of the Bird Dog II test results. The internal constant current source uses an internal (R25) 612 ohm resistor. To check if the entry for the internal resistor needs calibration, test the resistance of a known resistor. The 612 ohm resistor can be modified to calibrate the resistor measurement to be exact.

Settings	X					
Hardware settings Date: 2	/27/2006					
Calibration Resistor R25 (Typical 612 Ohm)	612					
R26(Typical 10,000 Ohm)	10000					
Leakage Fixed Resistor (Typical 200,000 Ohm)	200000					
Distortion Driving Velocity (Typiacal 1.8 cm/sec)	1.78					
Polarity Trigger Level (Volts, 0 - Auto)	0					
Drive Low Drive Z (% of normal Drive)	20					
Pulse Drive (Typical 70) 70						
Distortion Correction Factor (Computed)						
Voice (Requires Tap, Plus, Minus.wav)						
OK Cancel						

Figure 5.2 Hardware Setup

The Leakage test recommends using a 200 kOhm resistor. This resistor needs to be measured accurately for accurate Leakage measurements. Enter the exact value used for the parallel resistor in the leakage tests.

The geophone parameters will change depending on temperature. The Geotest program will automatically adjust the test readings to show what the results would have been at 20 degrees C operation. Enter the temperature of the geophone under test. The results of the test will be modified depending on the temperature entry. The Geotest program uses the temperature entered in the Geophone Specification to compute the temperature offset. Most manufacuters specify the geophone at 20 degrees C. (OYO/Geospace specify their geophones at 25 degree C).

Most geophones have the distortion specified at 1.8 cm/sec (0.7 in/sec) velocity. Geotest allows this drive level to be changed. Enter the desired drive level for the distortion test. Normal entry is 1.800 cm/sec.

R26 entry works very similar to R25. For normal operation set this entry to 10000.

The polarity test uses either tones or a wave file. The wave file can be used by selecting Voice in this entry.

Drive for Low Drive Z – This entry is used to set the drive level for the Low Drive Impedance Test. Enter the % of normal drive for the low drive Z tests.

For test purposes only the Pulse Drive can be adjusted in this menu.

Distortion Correction Factor (computed) – This is the distortion correction factor computed by the software. When an external source is used to drive the geophone, a correction factor must be applied to the result to obtain the correct distortion reading of the geophone. The computed total distortion from the FFT is multiplied by this "Correction Factor" to compute the actual geophone distortion.

5.1.3 Device Setup

Device

Device Setup window is used to detect and setup DAQLink units. Please, refer to section

4.1



Figure 5.3 Device Setup

5.1.4 Tolerance Setup

Tolerance

Menu Tolerance Settings is used to setup the default tolerance settings for geophones. These settings are only used for geophones where tolerances are not entered or equal to 0.

Settings	×
Tolerance settings	
Natural Frequency, %	5
Damping, %	5
Sensitivity, %	5
Resistance, %	5
Impedance, %	5
Distortion	0.5
Polarity +1/-1	1
LeakMax, Ohm	1000000
OK Cancel	

Figure 5.4 Default Tolerance Settings

Note: Normal Tolerance settings are set with the Geophone parameters

5.1.5 Geophone Selection and Specification

To obtain the correct tests results the geophone parameters for the units under test must be entered and selected. All geophones are listed in Geophone Specification table. To select a geophone for the test just click on it with the left mouse button. You can also modify existing geophone specifications or add new geophones to the table.

🅙 Geotest 🛛 - April_	18														
	BirdDo	g II Geo	ophone	e Test		Sei	smic	Source	e Co.	C	opyright 20	01-2006			
Test	Single	Seria 3	Par Par	rallel •	Cable R	esistano <u>hm/km</u>	ce Inf 5.	erval	Lead-in 7.0 m	Sto Units	ore Raw Sig	inal 💌 cm			
>>> Scope	Combana				CC 20CT					A 4 - CII					
🛄 Database	Geophone s	ecunys		Type 1	GS-30C1			New		Auco nii sp	ecification				
A Settings	Coil Resistance	(Rc, Ohi	m)			395	S	nunted I	mpedance (Zts, Ohm)		658.8			
Sectings	Moving Mass (M, Gram)			11.2	C	ase to C	oil Motion (Disp, cm p	top)	0.152			
🕜 Help	Drive Frequence	y (Fd, Hz	:)			12	Т	emperat	ure (deg C)		25			
	Shunt Resistor	(Enter O	for none	e)(Rd	, Ohm)	1000		Tolerar	nces setting	js					
Settings	Natural Freque	ncy (Fn,	Hz)			10	F	requency	y Tolerance	(+/-)%	2	2			
Current Database	Open circuit Da	mping (E	30)			0.316	D	amping `	Tolerance (+/-)%	2	2			
April 18	Shunted Damp	ing (Bt)				0.7	S	ensitivity	Tolerance	(+/-)%	2	2			
Controls	Open circuit Se	ensitivity (Go, V/c	m/s)		0.275	R	esistanci	e Tolerance	(+/-)%	2	2			
Hardware	Shunted Sensit	ivity (Gs,	V/cm/s)		0.197	Ir	npedanc	e Tolerance	(+/-)%	5	5			
Device	Shunted Resist	ance (Rc	s, Ohm	Ś		284	D	istortion	Tolerance	%		0.08			
Tolerance		ì	· · ·			1									
	Туре	Rc, Ohm	M,Gram	Fd, Hz	Rd, Ohm	Fn, Hz	Bo	Bt	Go, v/cm/s	Gs, v/cm/s	Rcs, Ohm	Zts, Ohm	Disp	Temp	FreqTol +
Auto Operation	N DD DDGT	005	44.0	10	1000	10	0.014		0.075	0.407	004	650.0	0.450		
Upload Test Signal	■ GS-30CT GS-32CT	395	11.2	12	1000	10	0.316	0.7	0.275	0.197	284	659.8	0.152	25	
Default Settings	GS-20DX	395	11.2	12	0	10	0.3	0.3	0.28	0.28	395	1957.6	0.15	25	
Label Print															
Font Size 10													<u></u>		
							_					-			2
	Save	Geophone		Dele	ete Geoph	one	E	kport Ge	ophone	Impor	Geophone	<u>.</u>			
Rx 🕒 Tx 😜															Version 2.76

Figure 5.6 Geophone Specifications

To add a new Geophone press New button and type in parameters in the top section of the Geophone Settings screen.

The Auto Fill feature can be used to compute impedance, shunted sensitivity and damping. When possible the empty fields will be computed and filled when the Auto Fill button is pressed.

Example:

Enter: Rc ,M, Fd, Rd, Fn, Bo, Go, Displacement

AutoFill computes: Bt, Gs, Rcs, Zts

Entries must be blank for auto fill to work. (Use delete key if you want to recalculate entered value)

After all entries in the top portion are correct, press Save Geophone button at the bottom of the screen to save the new geophone and its parameters.

Enter all parameters for a single geophone. The Geotest program will compute the specifications for the string using the single geophone specification.

- Type This is a text entry that allows the user to identify the parameters when selecting the geophone type. This can be the detailed name or as simple as red ones and blue ones
- Rc-Coil Resistance Coil Resistance of the geophone.
- M- Moving Mass Moving Mass of the geophone is used to compute the sensitivity of the geophone
- Fd- Geophone Drive Frequency determine the frequency that will be used for the distortion and impedance tests
- Rd- Damping Resistor Enter the value of the damping resistor. A zero should be entered when there is no shunt resistor.
- Fn- Natural Frequency Enter natural frequency of the geophone.
- Bo Open circuit Damping Enter the open circuit damping. This is the damping of the geophone with no damping resistor.
- Bt Shunted damping Enter the damping of the geophone with the damping resistor.
- Go Open circuit Sensitivity Enter the sensitivity of the geophone with no damping resistor.
- Gs Shunted Sensitivity Enter the shunted sensitivity of the geophone. This is the sensitivity of the geophone with the shunt resistor.
- Rcs- Shunted Resistance Enter the DC resistance of the geophone with the shunt resistor.
- Zts- Impedance Enter the shunted impedance of the geophone at the Fd (Drive Frequency).
- Disp Displacement of the geophone Enter the peak to peak displacement of the geophone. This entry is used to compute the Step drive level.
- @ Temp Enter the temperature that the geophone is specified at. Most geophone manufacturers use 20 degrees C to specify the geophone. OYO/Geospace use 25 degrees C to specify their geophones.

5.1.6 Units



Units – Centimeters- Inches - use this selection to switch between English and metric units. Note: Moving Mass is always entered in grams

5.1.7 String Selection

To perform test of geophone strings check String checkbox and choose enter number of series and parallel phones.



Figure 5.7 String Selection

You can quickly switch between String or Single geophone in the Main Test Window checking appropriate checkbox

5.1.8 String Resistance

There are entries in the program to compensate for the resistance in the in the wire in a geophone string. The resistance of the cable should be entered as xx ohms per 1000 meters. This value is typically about 120 ohms per 1000 meters.

Also enter the lead in length of the cable used on the string, and the spacing between the geophones. All of the entries should be in meters.

The GeoTest program automatically computes the added resistance and impedance of the caused by the wire in the geophone string

🕄 Geotest - April_	18														
	BirdDo	g II Geo	phone	Test		Sei	smic (Source	e Co.	G	opyright 20	001-2006			
Test	Single	Serial	Par 2	allel	Cable R	esistano)hm/km	e Int	erval	Lead-in 7.0 m	Store	ore Raw Si	gnal			
🔎 Scope	Geophone se		, , []	uno l	55.30CT			Nou		Auto fill en	ecification				
🛄 Database	Ceil Desistance	(Da Ohn		Abe 1	43-3001	loor		new		7ta Ohma	centeactor	050.0			
🐴 Settings	Moving Mass ((RC, Onn M, Gram)	1)			11.2		ase to C	oil Motion (Disp, cm p	top)	0.152			
🕜 Help	Drive Frequenc	y (Fd, Hz)			12	T	emperat	ture (deg C)		25			
	Shunt Resistor	(Enter 0 f	for none) (Rd,	Ohm)	1000		Tolerar	nces setting	IS					
Settings	Natural Freque	ncy (Fn, H	łz)			10	Fr	equenc	y Tolerance	(+/-)%	2	2			
Current Database	Open circuit Da	mping (B	D)			0.316	Da	amping	Tolerance (+/-)%	2	2			
April 18	Shunted Dampi	ng (Bt)				0.7	S	ensitivity	(Tolerance	(+/-)%	2	2			
Controls	Open circuit Se	nsitivity (Go, V/cr	n/s)		0.275	R	esistanc	e Tolerance	(+/-)%	2	2			
Hardware	Shunted Sensit	ivity (Gs. '	V/cm/s)		0.197	In	npedano	e Tolerance	(+/-)%	5	5			
Device	Shunted Resist	ance (Rcs	, Ohm)	r I		284	Di	istortion	Tolerance	%		0.08			
Tolerance	Type	Re Ohm	M Gram	Ed. Lit	Pd Ohm	En Liz	Ro	Dt	Go viemie	Ge viemie	Rec. Ohn	Zto Ohm	Dien	Tomp	ErecTol +
Auto Operation	Туре	Rt, Onin	M, Grann	ru, riz	Ru, Olilli	F11, F12	00	DI	OU, WOINS	OS, WUINS	rtts, onn	1218, 01111	Disp	remp	
Under all Track Closed	▶ GS-30CT	395	11.2	12	1000	10	0.316	0.7	0.275	0.197	284	658.8	0.152	25	
Upload Test Signal	GS-32CT	395	11.2	12	1000	10	0.316	0.7	0.275	0.197	284	658.8	0.152	25	
Default Settings	GS-20DX	395	11	12	0	10	0.3	0.3	0.28	0.28	395	1957.6	0.15	25	
Label Print				-											-
Font Size 10	•							1						1	Þ
	Save	Geophone		Dele	te Geoph	one	E	port Ge	ophone	Impor	t Geophon	e			
Induk ler															
RX 🜑 TX 🜑															Version 2.76

5.1.9 Store Raw Signal

🛃 Store Raw Signal 🛛

You may save some space on your hard drive if only the results of the test are stored to the database.

Uncheck the Store Raw Signal checkbox to store only the results. The program will not save recorded geophone response signal in this case.

Check the Store Raw Signal checkbox to store the signal trace along with the digital test results. The program will save recorded geophone response signal in this case.

5.2 Test Mode



The main test window shows which test are currently selected, the geophone type selected, and the results of the previous test or results loaded from database. For the saved record serial number and date of the test will be shown.

In this window you can quickly switch between Single geophone or String. There is also a place to enter current geophone temperature.

The Frequency, Damping, Sensitivity, Resistance, Impedance, and Distortion test will all be performed as one test. Clicking any of these tests will enable all of them.

The Polarity test is performed separately.

The Leakage test is also performed separately and a special cable configuration must be used.

You can adjust Tolerance settings using menu **Settings->Tolerance** (Refer to section 5.1.4)

🕄 GeoTest											
	BirdDog II	Geophone ⁻	Test	Seismic Source	e Co.	Copyright	it 2001-2005				
Vest	Geophone Type Natural frequen	GS-20DX icy 10 Hz	≥ 9	Single Serial F String 3 X	Parallel 2		Tem	Date: 7/ perature 20	/29/2006		
Database Settings	Frequency Result	Error	10 Hz Test	Damping Desult	Error	30.0 % Test	Sensitivity Result	Error	0.28 V/cm/s Test		
Help Test Device List	9.8 Hz	-2.0%	√ Pass	28.1%	-6.2%	X Fail	0.27	-3.5%	√ Pass		
DAQ Num Channel	Tolerance 5	%		Tolerance 5	%		Tolerance 5 %	6			
	Resistance Result	Error	395.0 Ohm Test	Impedance Result	Error	1957.6 Ohm Test	Distortion		Test		
Controls	414.3 Ohm	4.9%	√ Pass	1894.6 Ohm	-3.2%	√ Pass	0.12%		√ Pass		
St <u>a</u> rt Stop	Tolerance 5	%	_	Tolerance 5	%		Tolerance 0.5	; %			
Save Auto Sequence	 Polarity Result 		Positive Test	Leakage Result		Test	Low Drive Z Result	Error	1957.6 Ohm Test		
<u>Export</u> Import	Positive		✓ Pass				1914 Ohm	-2.2%	✓ Pass		
				Tolerance 10)00 kOhm		Tolerance 5 %	%			
	Coil Resistance, Ohm	1	395	Damping, %		0.3	Impedance, Ohm		1957.6		
	Moving Mass, Gram		11	Sensitivity, V/cm/s		0.28	Shunt Resistor, Ohm		0		
	AC Test Frequency, H	HZ	12	Resistance, Ohm		395	Calibration Resistor		612		
Rx 🕒 Tx 🕒	DAQ 140 - STOP re	ceived				1			Version 2.36		
🏄 Start 🛛 🥭 🙆 🍓	🕨 🎽 4 Windows Ex	. 👻 🖸 2 Micro	soft Ou 👻 🍯	The Society of E 🛛 🖬 2	Microsoft Wo	💌 🤡 Geotest	🦉 DatabaseMen	u2 < 🥩	/ 🏡 💻 3:24 PM		

Figure 5.8 Test Mode Window

Auto Sequence button enables or disables the auto sequence feature Auto Repeat button enables or disables the auto repeat function

5.2.1 Start the Test



Press New Test button to clear the results stored in memory and shown on the screen. Press Start button (or "A" key) at the bottom left of the Screen to acquire new test data.

After recording new data the results of the test will be shown on the screen. Depending on the result and tolerance settings the program will mark the results with Pass or Fail. If the tests results are within the user specified limits the tolerance box will be green, if the test result is outside the limits the tolerance box will be red.

5.2.2 Storing Data to Database

Save

After acquisition is finished you can save new data to database. To do that click the Save button at the bottom of the main Screen or press "S" key. A window will appear where you can enter a **Serial Number** and a **Comment** for current record. By default this window displays a comment from the previous record.

Store record				×
Results				Date: 24.02.2006
Geophone type	GS-30CT	String	Sing	jle
DAQ Number 1	36	Channel	1	
Frequency	9.97 Hz	Distortion		0.14%
Damping	67.2%	LoDrvImpeda	ance	
Resistance	349.6 Ohm	Polarity		
Sensitivity	0.252	Leakage		
Impedance	1069.1 Ohm			
Serial Number			Tem	perature
			20.0)*C
Comment				
Set default com	nent	<u>S</u> ave		Cancel

Figure 5.9 Save Results to Database

5.2.3 Leakage Test

🛃 Leakage

The Leakage test recommends using a 200 Kohm resistor. This resistor needs to be measured accurately for accurate Leakage measurements. Enter the exact value used for the parallel resistor in the leakage tests.

A resistor, typically 200Kohm, is connected between the positive and negative geophone connectors on the Bird Dog II cable. The positive end of the cable should be connected to one end of the geophone string. The negative end of the cable needs to be connected to a ground point to measure leakage.

Typically, a large water container is used to test leakage. The positive end of the Geophone Test cable should be connected to one end of the geophone string. The negative end of the Geophone Test cable is terminated in the large water container.

The geophone string is submerged in this water container. The Leakage test will measure the resistance between the positive and negative leads of the cable ignoring the 200Kohm fixed resistor. The correct value of the resistor must be entered in the Options-Hardware Setup-Leakage Fixed resistor entry. This test is used to verify the electrical isolation of the geophone string is adequate.

Connect both Positive and Negative side of the Geophone under test to the + connector-Ch1 + - Pin A Aout – Pin CC One side of 200 K resistor

Connect the – connector to a probe which is terminated in water container Ch1 – Pin B Aout FB – Pin GG Other side of 200 K resistor

Calibrating Leakage Test

Before testing leakage it is necessary to calibrate the Bird Dog II system for the leakage test. With the 200 K resistor in place and the Geophone string disconnected, select the leakage test and press "Start".

The leakage test will show a number in "gray". This is the computed resistance of the 200 K ohm fixed resistor and should be entered in the Hardware Settings.

🖲 Lea	akage 📃	Detail
#110	1.094 MegOhms	203499

In the above example "203499" should be entered in the Hardware setup Menu

Settings	
Hardware settings Date: 25	5.02.2006
Calibration Resistor R25 (Typical 612 Ohm)	612
R26 (Typical 10,000 Ohm)	10000
Leakage Fixed Resistor (Typical 200,000 Ohm)	203499
Distortion Driving Velocity (Typiacal 1.8 cm/sec)	1.78
Polarity Trigger Level (Volts, 0 - Auto)	0
Drive Low Drive Z (% of normal Drive)	20
Pulse Drive (Typical 70)	73
Distortion Correction Factor (Computed)	1.729
Voice (Requires Tap, Plus, Minus.wav)	
OK Cancel	

Enter value found in calibration test for "Leakage Fixed Resistor"

5.2.4 Polarity Test

Polarity

Select Polarity test in the main test window and press Start button. The program will switch to waiting mode. Slightly tap the geophone. If geophone signal exceeds Trigger level then the program will generate a beep and show results on the screen. The beep sound is different for positive or negative polarity. The beeps can be customized by using WAVE files. These files are located in the program folder.

You can change Polarity trigger level and enable WAVE files in the menu Settings->Hardware.

5.2.5 Hot Keys

Hot Keys are available to speed up the test operation. The following is a list of the keys for main operation:

Esc – Stops current test

F2 – or "S"- Saves data – Opens saves data screen – enter serial number and comment before saving data.

F3- Clears results

F5 – or "A" -Starts the main test (Frequency, Damping, Sensitivity, Resistance, Impedance, Distortion) for all of the DAQlink units.

F6- Starts polarity Test

F7 – Starts leakage test

F8 – Starts low drive impedance test

Example Production Test

- 1. Connect new string to be tested
- 2. Press F3 clears previous results
- 3. Press F5 performs Frequency, Damping, Sensitivity, Resistance, Impedance, and Distortion Tests
- 4. Press F6 starts polarity test
- 5. Tap each geophone on the string to check polarity
- 6. After test is completed Press F2 to save data
- 7. Enter serial number or use optional barcode reader
- 8. Press Alt S to save data

Go to Step 1 to test next string

See Auto Sequence for enabling multiple tests with a single keystroke

5.2.6 Auto Operation Mode

There is also and "Auto Operation" mode. This mode is very useful in testing many strings quickly.

Typically the "Auto Operation" is setup as follows:

Settings 🛛 🔀
Auto operation settings
Enable Auto Sequence
Low Drive Impedance Test
🕑 🛛 Freq, Damp, Sens, Res, Imp, Dist
🗹 Polarity Test
Polarity Test Stop after 1 hit
✓ AutoSave
Confirm Before Saving
🗹 Clear After Saving
📃 Auto Repeat Test
Auto Serial Number Increment Start with 40
OK Cancel

To operate in this mode:

First set up the Auto operation as shown above

Select the "Auto operation" in the main menu

Press the "New Test" button

- 1. Press the "F5" key to start acquisition
- 2. Wait for polarity test, and tap each geophone on the string. Make sure that each geophone passes the polarity Test.
- 3. Press "ESC" key to stop acquisition.
- 4. Press "ALT S" to save the data
- 5. Install new string
- 6. Go to step 1

5.2.6.1 String Troubleshooting Repeat Mode

If an error occurs during testing, then it is easy to stop the "Auto Sequence" Mode and retest the string.

To find a bad element in the general test, perform the following:

- 1. Press "ESC" to stop the "Auto Sequence" Mode
- 2. Click the "Auto Sequence" button on the main test screen to disable the "Auto Sequence mode
- 3. Click the "Frequency Test" to enable the "General Test"
- 4. Press the "Auto Repeat" key to enable the "Repeat" function
- 5. Turn all of the Geophones on their side.
- 6. Press Start
- 7. Turn one geophone upright one at a time
- 8. Look at results to determine bad geophone

The following screen shows the "Auto Operation" Enabled and the "Repeat" function disabled.

🎱 Geotest 🛛 - July	20					
	BirdDog II Ge	ophone Tes	it Se	ismic Source Co.	Сор	oyright 2001-2006
Cope	Geophone Type GS Natural frequency	3- 30CT 10 Hz	☐ Single ✓ String	Serial Paralle 3 X 2	l Temp	Date: 7/20/2007 erature 20
📃 Database	Frequency	10 Hz	Damping	70.0 %	Sensitivity	0.591 V/cm/s
🐁 Settings	Result Error	Test	Result	Error Test	Result	Error Test
Help	9.94 Hz -0.6%	🖌 Pass	69.8%	-0.2% 🖌 Pass	0.582	-1.5% 🖌 Pass
Test	Tolerance +2.0 °	% / -2.0 %	Tolerance	+2.0 % / -2.0 %	Tolerance	+2.0 % / -2.0 %
Device List DAQ Num Channel 395 1	Resistance Result Error	429.6 Ohm Test	Impedance Result	e 991.8 Ohm Error Test	Distortion Result	Test
	434.7 Ohm 1.2%	🖌 Pass	992.0 Ohm	0.0% 🖌 Pass	0.09%	V Pass
Controls	Tolerance +2.0 °	% / -2.0 %	Tolerance	+5.0 % / -5.0 %	Tolerance	0.2 %
New Test Start	Polarity Result	Positive Test	System Mess	ages olarity Test	Low Drive Result	Z 991.8 Ohm Error Test
Stop	Positive	🖌 Pass	Tes	st Completed		
Save			💽 Test Status	Leakage		
<u>Auto Sequence</u>					Tolerance	+5.0 % / -5.0 %
<u>Auto Repeat</u> <u>Export</u>	(2:10:03 PM) DAQ 395 - trigg (2:10:03 PM) DAQ 395 - rece (2:10:03 PM) DAQ 395 - finist (2:10:04 PM) DAQ 395 - finist (2:10:04 PM) DAQ 395 - finist	ered iving data ned acquisition ned data transmiss	sion	~		~

5.2.7Test Status Menu – System Messages

There is a Test Status Menu in the Main program. Either the "Leakage Test" or the Test Status Menu can be selected. Selecting Test Status will show the results and status of the testing process. This is very useful in the "Auto Sequence" Mode.

🔰 Geotest 🛛 - July	20					
	BirdDog	II Geophone Te	st Seismic	Source Co.	Сор	yright 2001-2006
Cope	Geophone Ty Natural free	pe GS-30CT quency 10 Hz	Single	Serial Parallel 3 X 2	Temp	Date: 7/20/2007 erature 20
🛄 Database	Frequency	10 Hz	Damping	70.0 %	Sensitivity	0.591 V/cm/s
🍓 Settings	Result	Error Test	Result Error	Test	Result	Error Test
🕜 Help	9.94 Hz	-0.6% 🖌 Pass	69.8% -0.2%	o 🖌 Pass	0.582	-1.5% 🖌 Pass
Test	Tolerance	+2.0 % / -2.0 %	Tolerance +2.0	% / -2.0 %	Tolerance	+2.0 % / -2.0 %
Device List DAQ Num Channel 395 1	Resistanc Result 434.7 Ohm	e 429.6 Ohm Error Test 1.2% √ Pass	Impedance Result Error 992.0 Ohm 0.0%	991.8 Ohm · Test › √ Pass	Distortion Result	Test ✔ Pass
Controls	Tolerance	+2.0 % / -2.0 %	Tolerance +5.0	% / -5.0 %	Tolerance	0.2 %
New Test	🔲 Polarity	Positive	System Messages		Low Drive	Z 991.8 Ohm
St <u>a</u> rt	Result	Test	Genera	al Test	Result	Error Test
Stop			Test Cor	npleted		
Save Auto Sequence			I fest StatusLe	eakage d	Tolerance	+5.0 % / -5.0 %
S Auto Repeat	(2:02:08 PM) DAQ 3	95 - finished data transmis	sion 🔼	18 Arc		~
Export	(2:02:10 PM) DAQ 3 (2:02:10 PM) DAQ 3 (2:02:10 PM) DAQ 3	95 - Ioaded parameters 95 - START received 95 - triggered	~			~

🥹 Geotest 🕞 July	20		
	BirdDog II Geophone Te	st Seismic Source Co.	Copyright 2001-2006
Cope	Geophone Type GS-30CT Natural frequency 10 Hz	Single Serial Paralle ✓ String 3 × 2	Date: 7/20/2007 Temperature 20
🛄 Database	Frequency 10 Hz	Damping 70.0 %	Sensitivity 0.591 V/cm/s
🍓 Settings	Result Error Test	Result Error Test	Result Error Test
() Help	9.94 Hz -0.6% 🗹 Pass	69.8% -0.2% 🖌 Pass	0.582 -1.5% 🖌 Pass
Test	Tolerance +2.0 % / -2.0 %	Tolerance +2.0 % / -2.0 %	Tolerance +2.0 % / -2.0 %
Device List DAQ Num Channel 395 1	Resistance 429.6 Ohm Result Error Test 434.7 Ohm 1.2% ✓ Pass	☐ Impedance 991.8 Ohm Result Error Test 992.0 Ohm 0.0% √ Pass	Distortion Result Test 0.09% ✓ Pass
Controls	Tolerance +2.0 % / -2.0 %	Tolerance +5.0 % / -5.0 %	Tolerance 0.2 %
New Test	Polarity Positive	System Messages	Low Drive Z 991.8 Ohm
Start	Result Test	(i) Polarity Test	Result Error Test
Stop	Positive 🗸 Pass	Waiting for Tap	
Save		Test Status Leakage	
<u>Auto Sequence</u>		Test Passeu	Tolerance +5.0 % / -5.0 %
<u>Auto Repeat</u> <u>Export</u>	[2:10:03 PM] DAQ 395 - receiving data [2:10:03 PM] DAQ 395 - finished acquisition [2:10:03 PM] DAQ 395 - finished data transmis [2:10:03 PM] DAQ 395 - waiting for trigger	ssion	

When the polarity Test is operating the Screen shows the following. This screen shows that the program is waiting on a geophone Tap signal:

5.3 Database

📃 Database

GeoTest version 2.68 and newer programs use a new database. The program should update old databases to the new format. The older programs will not be able to read the new database after the conversion process.

The new database includes tolerance settings for each geophone setting. Different Geophones have different manufacturer specifications, and these specifications and tolerances are entered into the database:

	Geophone se	ttings	Type GS	6-30CT			New [Auto fill s	pecification		
1	Coil Resistance	(Rc, Ohm)		3	395	Shun	ted Impedanc	te (Zts, Ohm)	58.8	
	Moving Mass (N	И, Gram)		1	1.2	Case	to Coil Motio	n (Disp, cm p	otop) 🚺	0.152	
	Drive Frequency	(Fd, Hz)		1	2	Temp	perature (de	gC)	2	25	
	Shunt Resistor ((Enter 0 for	none)(Rd, C	Dhm) 1	000	То	lerances sett	ings 🛛			
	Natural Frequen	icy (Fn, Hz))	1	0	Frequ	uency Tolerar	nce(+/-)%	6 2 2	2	
	Open circuit Dar	mping (Bo)		Ī	0.316	Damp	oing Toleranc	e(+/-)%	2	2	
	Shunted Dampin	ng (Bt)		Ī).7	Sens	itivity Toleran	ice(+/-)%	2 2	2	
	Open circuit Ser	nsitivity (Go	, V/cm/s)	Í).275	Resis	tance Tolera	nce(+/-)9	6 2 2	2	
	Shunted Sensitiv	vitv (Gs. V/	ːm/s)	6	1 1 97	Impe	dance Tolera	nce (+/-) (% 5 5		
	Shunted Resista	ince (Rcs, C) Dhm)	2	284	Disto	rtion Toleran	те %		1.2	
	Туре	Temp	FreqTol +	FreqTol -	Damp	Tol +	DampTol -	SensTol +	SensTol -	ResTol +	ResTol -
	CC DOCT	25	-	9	-			0	2		2
	GS-3UCT	20	25	21	2	25	25	2	25	25	25
-	GS-20DV	25	2.5	<u>د</u> رے	5	2.5	2.5	2.5	2.5	2.5	2.5
-	SG-10	20	25	21	5	- 10	10	25	25	35	35
	UltraPh2-3W	20	5		5	5	5	5	5	5.5	5.5
-	1-210	20	5		5	5	5	5	5	5	5
-	SM-4/U-B10Hz	20	5		5	5	5	5	5	2.5	2.5
	L-25D-30Hz	20	5		5	5	5	5	5	5	5

All of the tests results can be stored to a single database or to multiple databases. Multiple databases are commonly used to keep track of different geophone strings, or to keep track of geophones on different crews.

The database is also used to sort and analyze the saved data. Various export and report features are available within the database.

Click the Database button to enter the main database

Data from the current open project will be shown.

🕄 Geotest - April_	18												_	
	Bird	lDog II Ge	ophon	e Test	Se	eismic Sou	irce Co.		Copyright 2	001-2006				
📝 Test	SerialNum	DateTime	String	Frequency	Damping	Resistance	Sensitivity	Impedance	LoDrvImped	Distortion	Polarity	Leakage	GeoType	Com 🔺
		4/10/0007	Circula.	0.00	0.050	007.4	0.000	0000.0		0.00			00.0007	
>>> Scope		4/18/2007	2 Single	9.89	0.259	387.1	0.282	2069.2	0	0.30	1	0	GS-3UCT	
Databasa		4/10/2007	2 Single 1 Single	9.89	0.201	200.5	0.201	2002.9	0	0.00	-1	0	SM-4/U-B10F	
D atabase		4/18/2007	1Single	9.88	0.201	380.8	0.201	2003.9	0	0.12	1	0	SM-4/U-B10F	
A Settings		4/18/2007	Single	9.89	0.261	380.9	0.281	2063.8	0	0.12	1	0	SM-4/U-B10H	
w		4/18/2007	Single	9,9	0.261	380.6	0.281	2064.4	0	0.11	1	0	SM-4/U-B10H	
🕜 Help		4/18/2007	Single	9.89	0.261	380.9	0.281	2062.2	0	0.12	1	0	SM-4/U-B10H	
		4/18/2007	Single	9.89	0.261	380.9	0.281	2062.0	0	0.13	1	0	SM-4/U-B10H	
Database		4/18/2007	Single	9.89	0.261	380.8	0.281	2063.9	2060	0.11	1	0	SM-4/U-B10H	
Project		4/18/2007	Single	9.89	0.261	380.9	0.281	2063.9	2061	0.11	0	0	SM-4/U-B10H	
New Designsh		4/18/2007	Single	9.89	0.261	380.9	0.281	2064.2	2065	0.15	0	0	SM-4/U-B10H	
New Project	1	4/18/2007	Single	9.89	0.261	381.0	0.281	2064.8	2060	0.09	0	0	SM-4/U-B10H	
Open Project	2	4/18/2007	Single	218.06	0.343	4.0	0.025	5.4	5	11.15	0	0	SM-4/U-B10H	
1 April 18	3	4/18/2007	Single	9.89	0.261	381.1	0.281	2063.9	2059	0.11	1	0	SM-4/U-B10H	
2 Aug13	4	4/18/2007	Single	9.89	0.261	381.1	0.281	2064.8	2063	0.09	0	0	SM-4/U-B10H	
2. Augus	5	4/18/2007	Single	9.9	0.261	381.2	0.281	2064.4	2061	0.22	1	0	SM-4/U-B10H	
<u>3. Upen project</u>	6	4/18/2007	Single	9.9	0.261	381.0	0.281	2066.7	2066	0.14	1	0	SM-4/U-B10H	
	1	8/13/2007	2Single	9.99	0.699	288.4	0.20	682.2	0	0.06	0	0	GS-30CT	
Recent Projects	2	8/13/2007	2 Single	9,99	0.7	288.5	0.20	682.2	0	0.06	0	0	GS-30CT	
Cambrala	3	8/13/2007	2 Single	10.0	0.7	288.4	0.201	682.1	0	0.07	0	U	GS-30CT	
Controls	4	8/13/2007	2 Single	10.0	0.7	288.4	0.20	682.0	U	0.06	U	0	GS-3UCT	
Load Record	5	8/13/2007	2 Single	10.01	0.701	288.4	0.201	682.1	U	0.06	U	U	GS-3UCT	
Delete Record		8/13/2007	2 Single	9,99	0.7	288.4	0.20	602.3	0	0.06	0	0	GS-30CT	
Delete Record	- /	8/13/2007	2 Single	10.01	0.7	288.4	0.201	602.3	0	0.07	0	0	GS-SUCT	
Report Preview	0	0/13/2007	2 Single 1 Single	10.0	0.7	200.3	0.20	602.3	0	0.00	0	0	GS-SUCT	
Report Terren	10	0/13/2007	2 Single	10.0	0.7	200.4	0.20	602.3	0	0.00	0	0	GS-SUCT	
Print Specs	11	0/13/2007	2 Single	10.0	0.701	200.4	0.201	602.3	0	0.07	0	0	GS-SUCT	
Duint Labor	12	8/13/2007	Single	0.00	0.701	200.5	0.201	692.2	0	0.00	0	0	GS-30CT	
Print Label	13	8/13/2007	Single	10.02	0.099	288.4	0.201	691.9	0	0.00	0	0	GS-30CT	
Europet to File	14	8/13/2007	Single	10.02	0.701	288.4	0.201	681.9	0	0.06	0	0	GS-30CT	
Export to the	15	8/13/2007	Single	9,99	0.7	288.4	0.20	681.8	0	0.07	0	0	GS-30CT	
CSV Delimiter 🗾 💌	16	8/13/2007	Single	10.0	0.701	288.4	0.201	681.9	0	0.07	0	0	GS-30CT	
							1							•
														Þ
	All R	Records	ſ	Layout Setti	ngs	Restore	Layout	5	ave Layout					
	Filtore	Coophore	Tuno	Chrina	Records	Da		ald Marso	Min Maker	May Makes				
	Filters	Geophone	type	sung	Records	Rai	ige Hi	siu Name	MILL AND	Max value				
	Apply	<all types=""></all>	- <	All> 🔽 <al< th=""><th>l records></th><th> Ap </th><th>ply <a< th=""><th>l records> 🔻</th><th></th><th></th><th></th><th></th><th></th><th></th></a<></th></al<>	l records>	 Ap 	ply <a< th=""><th>l records> 🔻</th><th></th><th></th><th></th><th></th><th></th><th></th></a<>	l records> 🔻						

The following Projects operations can be performed:

- New Project Select "New Project" to open a new project
- Open Project Select "Open Project" to open an existing project which has been previously saved to the database
- Recent Projects A list of "Recent Projects" are shown under the "Open Project" button. These "recent projects" can be quickly opened by clicking the project name.

5.3.1 New Project

Press the "New Project" button to open the New project menu

Database	
Project	
New Project	Recent Projects X
Open Project	Project Name
1. Open project	GeophoneType1
<u>2. April 18</u> <u>3. Aug13</u>	C:\BirdDog\GeoTest_ver2.76\Projects\ 😕
	Copy settings from current
Recent Projects	Create Cancel

Enter the Name of the new project

Select "copy settings from current" to copy the settings from the current project to the new project.

Uncheck "copy settings from current" to select default settings for new project.

5.3.2 Open Project

Database						
Project	Load Project					<u>? ×</u>
Open Project	Look in: 🗲	Aug13		- 🗢 🖻	. 📩 🛄 -	
1. Open project	Results.FF	2				
2. April 18 3. Auq13						
Recent Projects						
Load Record	File name:	Results.FF2			Oper	7
Delete Record	Files of type:	Project files (results.	ff2)	•	Canc	

Press the "Open Project" button to open the Recent Project menu

Select the project to open

5.3.3 Recent Projects

Press the "Recent Project" button to open the Recent Project menu

Database		
Project	Recent Projects	
New Project	Recent Projects	Project Name
Open Project	April_18 Aug13	Open project
1. Open project	Open project	Project Path
2. April 18		C:\BirdDog\ver272\GeoTest_ve
<u>3. Auq13</u>		
Recent Projects		Load Cancel
Controls		

The list of recent projects will be shown.

Highlighting a project and clicking the right mouse button allows the selected "Recent Project" to be deleted

5.3.4 Main Database Menu

The main database menu allows the user to view and analyze the stored test results. To see a record from database in the main test window press Load Record button.

🔇 Geotest - April_	_18												_	
	Bird	Dog II Ge	eophon	e Test	S	eismic Sou	irce Co.		Copyright 2	2001-2006	i.			
Test	SerialNum	DateTime	String	Frequency	Damping	Resistance	Sensitivity	Impedance	LoDrvImped	Distortion	Polarity	Leakage	GeoType	Com
<u> </u>														
Scope		4/18/2007	2Single	9.89	0.259	387.1	0.282	2069.2	0	0.30	1	0	GS-30CT	
_	-	4/18/2007	2Single	9.89	0.261	379.4	0.281	2062.9	0	0.08	1	0	SM-4/U-B10H	
🛄 Database		4/18/2007	Single	9.89	0.261	380.5	0.281	2063.9	0	0.12	-1	0	SM-4/U-B10H	
(h) (h) (h)		4/18/2007	Single	9.88	0.261	380.8	0.281	2063.3	0	0.10	1	0	SM-4/U-B10H	
The Settings	_	4/18/2007	Single	9.89	0.261	380.9	0.281	2063.8	0	0.12	1	0	SM-4/U-B10H	
🔗 Help	-	4/18/2007	Single	9.9	0.261	380.6	0.281	2064.4	U	0.11	1	U	SM-4/U-B10F	
- neip		4/18/2007	Single	9.89	0.261	380.9	0.281	2062.2	U	0.12	1	U	SM-4/U-B10F	
Databasa	-	4/18/2007	Cingle	9.89	0.261	380.9	0.281	2062.0	2000	0.13	1	0	SM-4/U-B10F	
Database		4/18/2007	Cingle	9.89	0.201	380.8	0.281	2003.9	2000	0.11	1	0	SM-4/U-B10F	
Project		4/10/2007	1 Cingle	9.09	0.201	300.9	0.201	2003.9	2001	0.11	0	0	SM-4/U-B10F	
New Project	1	4/18/2007	Cingle	9.89	0.201	380.9	0.281	2004.2	2000	0.15	0	0	SM-4/U-BIOF	
	1	4/10/2007	1 Cingle	210.06	0.201	301.0	0.201	2004.0	2000	11.15	0	0	CM //L D10L	
Open Project	2	4/18/2007	1 Single	210.00	0.343	201.1	0.023	2062.0	2050	0.11	1	0	CM 4/U D10L	
1. April 18	4	4/19/2007	1 Single	0.00	0.201	201.1	0.201	2003.9	2009	0.00		0	CM_4/LED10L	
2. Open project	5	4/18/2007	Single	9.09	0.201	391.2	0.201	2004.0	2003	0.09	1	0	SM-4/LB10F	
3. Aug13	6	4/18/2007	1Single	0.0	0.201	381.0	0.201	2066.7	2066	0.22	1	0	SM-4/L-B10F	
	1	8/13/2007	1Single	0.00	0.600	288.4	0.201	682.2	0	0.06	0	0	GS-30CT	
	2	8/13/2007	2Single	9,99	0.7	288.5	0.20	682.2	0	0.06	- O	0	GS-30CT	
Recent Projects	3	8/13/2007	2Single	10.0	0.7	288.4	0.201	682.1	0	0.07	0	0	GS-30CT	
Controls	4	8/13/2007	2Single	10.0	0.7	288.4	0.20	682.0	0	0.06	Ő	, O	GS-30CT	
Load Record	5	8/13/2007	2Single	10.01	0.701	288.4	0.201	682.1	0	0.06	0	0	GS-30CT	
	6	8/13/2007	2Single	9.99	0.7	288.4	0.20	682.3	0	0.06	0	0	GS-30CT	
Delete Record	7	8/13/2007	2Single	10.01	0.7	288.4	0.201	682.3	0	0.07	0	0	GS-30CT	
	8	8/13/2007	2Single	10.0	0.7	288.5	0.20	682.3	0	0.06	0	0	GS-30CT	
Report Preview	9	8/13/2007	2Single	10.0	0.7	288.4	0.20	682.3	0	0.06	0	0	GS-30CT	
D: LC	10	8/13/2007	2Single	10.0	0.701	288.4	0.201	682.3	0	0.07	0	0	GS-30CT	
Print Specs	11	8/13/2007	2Single	10.0	0.701	288.5	0.201	682.3	0	0.06	0	0	GS-30CT	
Print Label	12	8/13/2007	2Single	9.99	0.699	288.4	0.20	682.2	0	0.06	0	0	GS-30CT	
	13	8/13/2007	2Single	10.02	0.701	288.4	0.201	681.9	0	0.06	0	0	GS-30CT	
Export to File	14	8/13/2007	2Single	10.0	0.7	288.4	0.20	681.9	0	0.06	0	0	GS-30CT	
	15	8/13/2007	2Single	9.99	0.7	288.4	0.20	681.8	0	0.07	0	0	GS-30CT	
<u>USV Delimiter</u> . •	16	8/13/2007	2Single	10.0	0.701	288.4	0.201	681.9	0	0.07	0	0	GS-30CT	
			1					1						
														•
								_		_				2
	All F	Records		Layout Setti	ngs	Restor	e Layout	9	ave Layout					
	Filters	Geophone	Туре	String	Records	Ra	nge Fi	eld Name	Min Value	Max Value				
	Apply	All types:	> - <	All> 💌 <a< th=""><th>II records></th><th>• Ap</th><th>ply <a< th=""><th>ll records> 🝷</th><th></th><th></th><th></th><th></th><th></th><th></th></a<></th></a<>	II records>	• Ap	ply <a< th=""><th>ll records> 🝷</th><th></th><th></th><th></th><th></th><th></th><th></th></a<>	ll records> 🝷						
	1													

Figure 5.10 Database Window

The database menu allows the user to look at the data in many different formats. To display limited set of records according to some criteria use Filters and Range panels. Filters let you select geophones of a certain type, one of the string configurations or records that passed or failed the test. Using Range panel you can show records that fall between Min and Max value of a certain parameter. To cancel Filter or Range press All Records button.

5.3.5 Database Layout Menu

Layout Settings

The database layout menu allows the user to select which parameter to view in the database and on the reports. The column titles can also be changed.

A check mark enables the field to be displayed in the database.

Settings					
Layout settir	igs			Date: 24.02.2	2006
Column	Title	1	Column	Title	\checkmark
DAQNum	DaqN		SpecFrequency	SpecFreq	
ChanNum	ChN		SpecDamping	SpecDamp	
SerialNum	SerialN	✓	SpecSensitivity	SpecSens	
DateTime	DateTime	✓	SpecResistance	SpecRes	
String	String	✓	SpecImpedance	SpecImp	
Temperature	Temp		CoilResistance	CoilRes	
Data	Data	✓	MovingMass	Mass	
Frequency	Freq	✓	TestFrequency	TestF	
Damping	Damp	✓	ShuntResistor	ShuntR	
Resistance	Res	✓	CalibrationResistor	CalibrR	
Sensitivity	Sens	✓	GeoType	GeoType	~
Impedance	Imp	~	SpecTemperature	SpecTemp	
LoDrvImpedance	LoDrvImp	✓	Comment	Comment	
Distortion	Dist	~			
Polarity	Pol	~			
Leakage	Leak				
Default Setting	5		ОК	Cancel	

Figure 5.11 Layout Settings

🎒 Geotest - April_	18														<u>- 0 ×</u>
		Bird	Dog II Ge	ophon	e Test	S	eismic Sou	rce Co.		Copyright 2	001-2006				
📝 Test	5	erialNum	DateTim 🗸	String	Frequency	Damping	Resistance	Sensitivity	Impedance	LoDrvImped	Distortion	Polarity	Leakage	GeoType	Com
Scope			10/3/2007	Single	9.74	0.286	400.9	0.269	1869.0	0	0.04	0	0	GS-20DX	
			10/3/2007	Single	9.74	0.286	400.9	0.269	1869.0	0	0.04	0	0	GS-20DX	
🛄 Database			10/14/2007	Single	9.9	0.311	400.2	0.264	1767.3	0	0.11	0	0	GS-20DX	
춳 Settings															
🕜 Help															
Database															
Project															
New Project															
Open Project															
1. April 18															
2. Open project															
3. Aug13															
Recent Projects			1	1						1					
Controls		-1	<u> </u>						1			1			
Load Record		All R	ecords	ſ	Lavout Setti	nas	Restore	Layout	5	ave Lavout					
Delete Record		Filters	Geophone 1	U Type	String	Records	Ra	nge Fi	eld Name	Min Value	 Max Value				
Report Preview		Apply	GS-20DX	• <	All> 🔽 <a< th=""><th>ll records></th><th>• Ap</th><th>ply <a< th=""><th>I records> 💌</th><th></th><th></th><th></th><th></th><th></th><th></th></a<></th></a<>	ll records>	• Ap	ply <a< th=""><th>I records> 💌</th><th></th><th></th><th></th><th></th><th></th><th></th></a<>	I records> 💌						
Rx 🜑 Tx 🜑														Versio	n 2.76

Using the cursor and the left mouse button, the order of the fields can be selected by tagging and dragging the fields in the main database menu.

Figure 5.12 Sorting Records

Left clicking the title bar can change the order of the data in the database. **Example**:

Left clicking time and date will sort the fields by time and date.

Left clicking serial numbers will sort by serial number

The Filters, and Ranges at the bottom of the screen can be changed. The affect on the database can be seen immediately by pressing the Apply buttons.

5.3.6 Reports

The Geotest program has a powerful and flexible function of creating reports. Report is generated using information currently visible in Database Window. Using Layout Settings, Filters, Range and Tolerance you can display only information that you need. Information from the screen will go to the report.

Report Preview

Press Report Preview button to see report on the screen. You can select a printer or adjust printer settings in this window.

Preview - Tabular information		X	
Print Printer setup Scale Previous	Next Stop Core		
	Paper, 1	9 at:2402.2004	
SeismicSource Gr Television Tragence-11-8-00 Television Tragence-11-8-00 <th c<="" th=""><th>Bottost Report type 1149 104</th><th>arflon 4. 68 Pei 1 (ask- 1668) So day [[cid Pei] [as man 1 G 120 0 G 0.17 0 [2an p # of can me at G 0.22 0 G 0.22 0 G 0.23 0 G 0.11 0 G 0.11 0 G 0.11 0 G 0.10 0 G 0.10 0 G 0.23 0 G 0.11 0 G 0.10 0 G 0.22 0 G 0.20 0 G</th></th>	<th>Bottost Report type 1149 104</th> <th>arflon 4. 68 Pei 1 (ask- 1668) So day [[cid Pei] [as man 1 G 120 0 G 0.17 0 [2an p # of can me at G 0.22 0 G 0.22 0 G 0.23 0 G 0.11 0 G 0.11 0 G 0.11 0 G 0.10 0 G 0.10 0 G 0.23 0 G 0.11 0 G 0.10 0 G 0.22 0 G 0.20 0 G</th>	Bottost Report type 1149 104	arflon 4. 68 Pei 1 (ask- 1668) So day [[cid Pei] [as man 1 G 120 0 G 0.17 0 [2an p # of can me at G 0.22 0 G 0.22 0 G 0.23 0 G 0.11 0 G 0.11 0 G 0.11 0 G 0.10 0 G 0.10 0 G 0.23 0 G 0.11 0 G 0.10 0 G 0.22 0 G 0.20 0 G
	Printer setup Margins Iop 2 Bottom 2 Left 2 Stretch lon Bight 2 Stretch lon Anial	width on one page 🔽 whole grid ge column widths Optimal column gridths 🗍 g lines 📄 Colored 🗍 QkCancel	
Periords; 10 Bad Reconds; + Groot Reconds; 6			

Figure 5.13 Report Preview

To print geophone specifications that were used in the report press Print Specs button.

Print Specs

To save report to file using various formats press Export to File button.

Export to File

5.4 Scope Mode



In this mode you can view data that were acquired from geophone. Buttons **Start**, **Stop** and **Save** had same functions as and same buttons in the Main Window.



Figure 5.14 Scope Window

The red (Out) trace is the actual geophone signal. The blue (In) trace is the drive signal used to create the geophone response.

Figure shows the test performed by the Geotest program. The Red plot is the actual output of the geophone and the blue plot shows the driving reference signal.

The two step pulses (positive and negative) are used to compute resistance, frequency, sensitivity, and damping.

The sine wave is used to compute impedance and distortion.

5.4.1 Setting Zoom Level

Buttons **Axis**, **Full View and Reference Off** help to adjust a view of a selected plot. These functions are also available in pop up menu if you click on the plot with right mouse button.



To adjust zoom with the mouse press the left mouse button and make a box to zoom in on an area of the plot.



Figure 5.15 Zooming in with the mouse

5.4.2 Distortion Window Setting Zoom Level

The Distortion Button is used to view the sine wave test in the frequency domain



The % Total Distortion measurement compares the Fundamental Energy (Energy at the Drive Frequency) to the Noise Energy (All Energy not at the Drive Frequency)

5.4.3 Vscope Program

After setting up the box with the Geotest program, the Vscope program can be used for more detailed analysis.

The Vscope program allows general seismic processing capabilities. The Vscope program can be used for detailed research on the geophone parameters. The following is just a short list of the Vscope program's capabilities:

- Overlays of different geophone tests can be made
- Time Variant Spectral Analysis can be done
- Exporting data to Seg-Y or Ascii file
- Loading special analog drive signal

6 Geophone Tests

Natural Frequency – The Bird Dog II unit performs a step response to determine the frequency of the geophone. The zero crossings are used to determine the period of the response. The computed damping and the period are then used to determine the natural frequency of the geophone element.

Damping – The Bird Dog II unit performs a step response test to determine the damping of the geophone. The peak amplitude of the oscillations occurring after the step response is used to determine the damping of the geophone. The quicker the amplitudes decrease the larger the damping will be.

Sensitivity - The Bird Dog II unit performs a step response test to determine the sensitivity of the geophone. During the step the element is raised using a constant current source. The amplitude response after the step, the moving mass of the element, the computed natural frequency, and the computed damping are all used to compute the sensitivity of the geophone element.

Resistance – The Bird Dog II unit applies a constant current to the geophone and measures the voltage across the element. The resistance is then computed by dividing the Voltage by the current.

Impedance – The Bird Dog II applies an AC signal at the frequency selected in the geophone specification. The impedance is then measured similar to the way the resistance was measured. When different frequencies are selected the impedance will change.

Distortion – The Bird Dog II computes the distortion with the same signal used for impedance. A FFT is performed to convert the signal to the frequency domain. The driven frequency (Fundamental) Energy is then compared to the energy of the higher frequencies (noise). The ratio of the Noise/Fundamental is used to compute the % total harmonic distortion.

Polarity – The Bird Dog II records the data from the geophone and looks for the first break. A tap on the top of the element producing a positive voltage is considered "Positive" polarity. A negative first break pulse is considered "Negative" polarity. This is consistent with the SEG recommended polarity standard (Downward Motion (Tap on top) = Positive Voltage). The polarity test can be set to "**repeat**". When "repeat" is selected the test will repeat until it is stopped. Two different audible tones are made by the computer, one for positive polarity and one for negative polarity. The result of the last test will be saved to the database when the data is stored.

Leakage – A resistor typically 200Kohm is connected between the positive and negative geophone connectors on the Bird Dog II cable. The positive end of the cable should be connected to one end of the geophone string. The negative end of the cable needs to be connected to a wire that is terminated in a large water container. The geophone string is submerged in this water container. The Leakage test will measure the resistance between the positive and negative leads of the cable ignoring the 200Kohm fixed resistor. The correct value of the resistor must be entered in the Options-Hardware Setup-Leakage Fixed resistor entry. This test is used to verify the electrical isolation of the geophone string is adequate.

7 Hardware Setup

7.2 Geophone Mounting and Isolation

For proper test results, it is important that the geophone or the geophone string under test be isolated from normal ground movement. This is especially important when working in a trailer or other portable building.

A simple isolation box can be made by filling a box with sand, and placing the box on a piece of foam rubber. Planting the geophones under test in the "sand box" will greatly improve the reliability of the tests.

8 Wiring Documentaion

8.1 Bird Dog II Connector Wiring

8.1.1 Power LED -

Illuminates when power is applied to box.

Caution if Battery voltage drops below 11 volts, LED will light but DAQlink will not perform properly

8.1.2 Three pin trigger Connector –

A– TB active – A B– TB return – B

When DAQlink trigger option is set to trigger on Time Break, then this input is used to trigger the box. This input drives an optoisolated input and requires about 3 volts minimum to trigger. Positive Voltage should be applied to pin A, and negative voltage to pin B. Maximum voltage should be less than 60 volts.

NOT USED WITH GeoTest Software

8.1.3 Power – 2 pin MS to X9 connector

A - +battery – A B – negative battery - B

The DAQlink unit has a bridge rectifier built into the power circuit, so the unit will power with either polarity on the battery connection. There are two internal fuses on the board to prevent damage to the unit. However, we still recommend using an external fast blow fuse of 2 amps.

The unit can be powered from any DC source supplying a minimum of 11 VDC to a maximum of 37 VDC.

8.1.4 Ethernet – 10 base T

Standard Patch cable to Computer

PT 22-55 connector

A- Ch 1 pos	v- Ch 22 pos
B- Ch l neg	w- Ch 22 neg
C- Ch 2 pos	x- Ch 23 pos
D- Ch 2 neg	y- Ch 23 neg
E- Ch 3 pos	z- Ch 24 pos
F- Ch 3 neg	AA- Ch 24 neg
G- Ch 4 pos	
H- Ch 4 neg	D/A wiring
J- Ch 5 pos	CC – Aout
K- Ch 5 neg	GG – Aout FB
L- Ch 6 pos	HH - GND
M- Ch 6 neg	
N- Ch 7 pos	
P- Ch 7 neg	DD - TB(A)
R- Ch 8 pos	EE - TB(R)
S- $6 - Ch 8 neg$	
T- $7 - Ch 9 pos$	FF - + 24 volts
U- $8 - Ch 9 neg$	
V- 9 – Ch 10 pos	
W- $10 - Ch \ 10 \text{ neg}$	
X- 11 – Ch 11 pos	
Y- $12 - Ch \ 11 \ neg$	
Z- 13 – Ch 12 pos	
a - Ch 12 neg	
b- Ch 13 pos	
c– Ch 13 neg	
d– Ch 14 pos	
e – Ch 14 neg	
f– Ch 15 pos	
g– Ch 15 neg	
h - Ch 16 pos	
1 - Ch 16 neg	
J - Ch I7 pos	
k - Ch 17 neg	
m - Ch 18 pos	
n - Ch 18 neg	
p - Ch 19 pos	
q - Ch 19 neg	
r - Cn 20 pos	
s - Cn 20 neg	
t - Ch 21 pos	
u - Ch 21 neg	

8.2 Bird Dog II Geophone Test Cable – Version 2

Geophone Plus -(Ch1 +) - Pin A Aout – Pin CC

Geophone Minus (Ch1-) – Pin B Aout FB – Pin GG Ch2 + - Pin C

Ground

GND – HH (Ch2 -) – D



PT22-55 S

Bird Dog II

8.3 Bird Dog II Geophone Leakage Cable

A resistor typically 200Kohm is connected between the positive and negative geophone connectors on the Bird Dog II cable. The positive end of the cable should be connected to one end of the geophone string. The negative end of the cable needs to be connected to a wire that is terminated in a large water container. The geophone string is submerged in this water container. The Leakage test will measure the resistance between the positive and negative leads of the cable ignoring the 200Kohm fixed resistor. The correct value of the resistor must be entered in the Options-Hardware Setup-Leakage Fixed resistor entry. This test is used to verify the electrical isolation of the geophone string is adequate.

Connect both Positive and Negative side of the Geophone under test to the + connector-Ch1 + - Pin A Aout – Pin CC One side of 200 K resistor

Connect the – connector to a probe which is terminated in water container Ch1 – Pin B Aout FB – Pin GG Other side of 200 K resistor