

DAQLink II System 24 bit Acquisition System



User's Manual

DAQLink II System User's Manual

Printed in U.S.A.

©2001-04 Seismic Source Co. • All rights reserved. This document may not be reproduced in any form without prior express written consent from Seismic Source Co.

Seismic Source reserves the right to make changes and improvements to its products without providing notice.

Trademarks DAQLink II and VScope are trademarks of **Seismic Source Co**.

Seismic Source Co.

9425 E. Tower Rd. Ponca City, OK 74604 USA Telephone: (580) 362-3402 Fax: (580) 362-1470 Email: <u>mail@seismicsource.net</u>

www.seismicsource.net

Table Of Contents

TABLE OF CONTENTS	3
1 INTRODUCTION	5
1.1 System Description	5
1.3 DAQLink Software Installation and Setup	5
2 ETHERNET SETUP	6
3 CABLE CONNECTIONS	8
3.1 DAQLink Cable Connections	8
4 CONFIGURING THE PROGRAM	9
4.1 DAQLink Setup	9
4.1.1 IP settings	
4.1.2 DAQLink Order	
4.1.3 Copy to All	
4.2 DAQLink Configuration	
4.2.1 Device Acquisition Menu	
4.2.2 Weights Menu	
4.2.5 Higger Menu	
4.2.5 Device GPS	
5 PROGRAM OPERATION	15
5.1 Acquisition	
5.2 Projects	15
5.3 Database	
5.3.1 Loading Data From Database	
5.3.2 DAQLink and Channel Configuration	
5.3.3 Import and Export Data	
5.3.4 Storing Data to Database	
5.4.1 Graph plot types	
5.4.2 Store Plot Menu	
5.4.3 Seismic Plots	
5.4.4 Setting Zoom Level	
5.4.5 Additional Plot Functions	
5.4.6 Filters	
5.4. / Display Settings	
5.4.8 Auto Operation	

5.5 Status information Tabs	
5.5.1 Comment	
5.5.2 Sweep Information	
5.5.3 Plot Information	
5.5.4 Status	
5.5.5 Errors	
5.5.6 Communication Tab	
6 SPECIFICATIONS AND OPTIONS	31
6.1 Options	
6.2 Specification	
6.2.2 DAQLink II	
7 SCHEMATICS	
7.1 DAQlink Connector wiring	
7.2 DAQlink panel wiring	

1 Introduction

1.1 System Description

The DAQLink II system is a multiple channel 24 bit analog to digital acquisition system. Each DAQLink II unit can have 6 to 24 independent analog channels. Multiple DAQlink units can be connected together for increased number of channels. The DAQLink II uses standard 10/100 Base RJ45 network connection and standard TCP/IP network protocol. The DAQLink II can be connected to any standard network configuration.

The DAQLink II has provisions for the following options

- Two RS232 inputs and outputs
- GPS receiver for position information
- GPS receiver for timing reference, and adjustment of internal oscillator
- One 16bit D/A analog output
- Four pre-amp gain settings
- Compact Flash for storage of acquired signals

The DAQLink 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 DAQLink II requires only 2 channels. The DAQLink II is also capable to output analog signal using the 16 bit D/A converter.
- Computer The DAQ Link unit connects to a computer with Windows 98, Windows NT or Windows 2000 operating system and an Ethernet Network Interface Card (NIC).
- VScope software operates on the computer and communicates to the DAQ Link units. The Software package allows viewing, analysis, and storage of the acquired signals.
- Connection cables are included to connect:
 - Power (11-36 VDC)
 - o Ethernet cable to connect DAQLink II to computer
 - Analog Input connector Custom cables are available upon request

1.3 DAQLink Software Installation and Setup

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

• Vscope.exe – Program used to acquire analyze and store the analog data.

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 2000 computer this can be done by the following procedure:

Right Click on My Network Places and select Properties.



Figure 2.1 Network Properties

Right Click on an icon that corresponds to your network card and select Properties.

The Fair New Tuser, Lounar Tools Lable William	ow Teh	
Manager I and a second second	Internet Protocol (TCP/IP) Propertie	25
al Area Connection Properties	Connect	
ieneral	You can get IP settings assigned autor	naticallu if your network supports
Connect using:	this capability. Otherwise, you need to the appropriate IP settings.	ask your network administrator for
Kingston EtheRx IC PCCard Ethernet Adapter (KNE-PC2)		
	Obtain an IP address automatical	lly
Components checked are used by this connection:	Use the following IP address:	
File and Brinter Sharing for Microsoft Networks	IP address:	192.168.0.101
✓ Internet Protocol (TCP/IP)	Subnet mask:	255 . 255 . 255 . 0
A NWLink NetBIUS A NWLink IPX/SPX/NetBIOS Compatible Transport Proto	Default gateway:	
	C Obtain DNS server address autor	natically
	_⊂ ⊂ Use the following DNS server ad	dresses:
Description Transmission Control Protocol/Internet Protocol. The default	Preferred DNS server:	
wide area network protocol that provides communication across diverse interconnected networks.	Alternate DNS server:	· · ·
Show icon in taskbar when connected		Advanced

Figure 2.2 IP configuration

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.

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

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 Windows XP 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.

🖾 Command Prompt	
Microsoft Windows 2000 [Version 5.00.2195] (C) Copyright 1985-2000 Microsoft Corp.	
C:\>ipconfig	
Windows 2000 IP Configuration	
Ethernet adapter Local Area Connection:	
Connection-specific DNS Suffix .: IP Address	

3 Cable Connections

3.1 DAQLink Cable Connections

- Connect DAQ Link to computer with patch cable provided
- Connect 11-37 VDC supply to DAQ Link cable (polarity does not matter). 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 Trigger cable to the trigger source
- Connect the Analog input cable

4 Configuring The Program

4.1 DAQLink Setup

Connect and power up DAQLink unit. Start the VScope program by double clicking on Vscope.exe file in Windows Explorer. Select the DAQ setup menu by selecting menu **Options-**>**Device**.

If no unit serial numbers are displayed in the window click Auto Detect. All DAQLink units connected to computer should be automatically found and displayed.

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. Multiple DAQLink units can be connected to one computer using standard network equipment (hubs, switches, wireless access points, etc).

DAQ 9	Setup			×
_On	DAQ Link Name	Serial #	.	<u>A</u> dd
				<u>R</u> emove
	DAQ 10	10		Auto Detect
	DAQ 11	11		DA <u>Q</u> Settings
	DAQ 5	5		<u>C</u> opy To All
		3	•	I <u>P</u> Settings
				🗸 ОК

Figure 4.1 Device setup

Figure 4.1 shows five DAQLink units connected to the computer.

The first column shows that DAQ1, DAQ2, and DAQ5 have been selected for acquisition.

The second column, DAQLink name field, can be changed by the user.

The Serial # field is hardware programmed into the DAQLink unit and cannot be changed.

In figure 4.1, DAQ unit 5 is highlighted. Clicking DAQ Settings or IP Settings will show the configuration of the highlighted unit. To highlight a different unit simply left click on a different DAQ link name.

Remove Button will remove the highlighted unit from the list.

Add button can be used to add a new DAQLink unit. However, it is recommended to use the auto detect feature to add new units.

4.1.1 IP settings

Each DAQLink unit should have a unique IP address. The IP setting selection allows viewing and editing of the current IP setting for the unit.

For the IP address shown, the 192 defines a class C network. With class C networks the first 3 octets must be the same for all units. This means that the first three entries (192.168.0) must be the same for the units to communicate. The last octet is a number between 0-255. The number 0 and the number 255 are reserved and should not be used for a DAQLink IP address. Only the numbers 1-254 should be used. The computer's IP address should also be unique; it cannot have the same IP address as a DAQLink unit.

The Net Mask should be the same for all units. All bits that are not 0 in the net mask have to match. 255.255.0 mask is shown which means the first 3 bytes (octet) have to match.

Auto IP configuration - Auto IP is the same as DHCP configuration. The DHCP server does the IP configuration automatically. The DHCP server supplies an IP address to any host that asks for it. Recommend always using manual address when possible, because it's easier to troubleshoot in case of a problem.

Device Properties	×
Device	
DAQ name: DAQ 1 DAQ number: 1 Resolution: 24 Firmware version: 2.24 Release date: 7/17/2002	
IP Address: 192.168.0.141	Apply
Net Mask: 255.255.255.0	
Use Auto IP Configuration (DHCP)	
	Close

Figure 4.2 Device IP selections

4.1.2 DAQLink Order

The order in which the DAQLink units are shown is the same order that they will appear when the data is displayed. The up and down arrows can be used to change the order of the DAQLink units.

4.1.3 Copy to All

After setting up one DAQLink unit, the DAQ settings can be copied to the other units. Highlight the DAQLink unit that has been "setup", and then click the "copy to all" button to copy the "setup" parameters to the other units.

4.2 DAQLink Configuration

It is important on new installations to check the DAQ settings. Click the DAQ Settings button and the DAQLink Configuration Menu should appear. This will also check that communication to the DAQLink unit is working properly. If the configuration window does not appear, it means that the DAQLink unit selected is not responding. 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.

An additional check of communication can be performed by first removing all DAQ units from the DAQ setup 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.

4.2.1 Device Acquisition Menu

This menu allows the user to setup the acquisition parameters for the selected DAQLink unit. Up to 24 channels per DAQLink unit are shown. The DAQLink unit automatically checks the number of operating channels when the unit is reset.

The channels must be enabled to acquire data. A check mark shows that the channel is enabled.

The end user can change the name field.

The type field should be set to generic unless acquiring data from a servo hydraulic vibrator. When performing quality control tests on a servo hydraulic vibrator it is very important to select the correct "type' for each channel.

Gain – 4 preamp gains can be selected (x1, x10, x100, x1000)

DC-removal – Should normally be set to auto, for automatic removal of DC

Units, Scale and Sercel scaling are all used for quality control of "servo hydraulic vibrator". These entries are used to compute pounds or Kilograms in the quality control plots.

Same Settings in all Channels – clicking this will copy all of the highlighted settings to all of the other channels

Config	jurati	ion - DAQ 10	D							×
Acqu	Acquisition Weights Trigger Calibration Analog Output GPS ReTx									
[Char	nnels									
#	On	Name	Туре	Gain	DCRem	noval	Units	Scale	Sercel	
1	◄	Chan 1 💽	Generic 💌	1 💌	Auto 💌	1.001	lbs	1		
2	◄	Chan 2 📑	🖌 Generic 💌	1 💌	Auto 💌	1.001	lbs	-		
3		Chan 3 💽	🖌 Generic 💌	1 💌	Auto 💌	1.001	lbs	-		
4		Chan 4 💽	🖌 Generic 💌	1 💌	Auto 💌	1.001	lbs	-		
5		Chan 5 💽	🖌 Generic 💌	1 💌	Auto 💌	1.001	lbs	-		
6		Chan 6 💽	🖌 Generic 💌	1 💌	Auto 💌	1.001	lbs	-		Ţ
Sample Interval 0.5 rmsec Auto Start Acquisition Time 6 sec										
OK X Cancel										

Figure 4.3 Device Acquisition Menu

4.2.2 Weights Menu

This menu is used to compute the scaling factors for quality control of Servo Hydraulic Vibrator. Enter the correct weights for the vibrator under test and the correct sensitivity for the accelerometer being used.

Configurati	on - DAQ 1		×
Acquisition	Weights Trigger Calibration Analo	og Output GPS ReTx	
	Reaction Mass:	1000	
	Base Plate:	1000	
	Hold Down:	10000	
	neter Sensitivity		
	Loop Reaction Mass:	25	
	Loop Base Plate:	25	
	Sim Reaction Mass:	25	
	Sim Base Plate:	25	
	ОК	🗶 Cancel	

Figure 4.4 Vibrator Weights

4.2.3 Trigger Menu

The trigger menu is used for all acquisition. The trigger can be set to one of the following selections

- Auto Trigger When auto trigger is selected the DAQLink unit starts acquiring as soon as the start command is processed
- Trigger on Time Break When trigger on Time Break is selected the DAQLink unit receives and processes the start command from the computer, it then waits for a signal on the Time break line before it starts to acquire data. The time break signal is an optically isolated input to prevent ground loops. The input can handle large voltages up to 60 volts without damage to the circuit. At least 3 volts should be applied for reliable triggering. The unit can either trigger on a low going high voltage or a high going low voltage.
- Trigger on input channel When trigger on input channel is selected the DAQLink unit receives and processes the start command from the computer, it then waits for the threshold voltage on the selected channel to be exceeded.

Configuration - DAQ 1
Acquisition Weights Trigger Calibration Analog Output GPS ReTx
Trigger Settings Auto Trigger
O Trigger On TimeBreak Pulse Edge Low-High
O Trigger On Input Channel Chan 1 ▼ Level 1.0 V
OK Cancel

Figure 4.5 Device Trigger

4.2.4 Device Analog Output

The DAQLink unit can output a 16 bit Analog signal. The signal file must first be selected then the program DAQ button must be clicked. When the program DAQ button is pressed the selected file is downloaded to the DAQLink Flash memory card. To enable D/A output select signal number from the Enable Output list.

For normal Seismic acquisition, the output should be disabled.

Configuration - DAQ 1	(Open ? X
Acquisition Weights Trigger Calibration Analog Dutput GPS ReTx	Look in: 🔁 Vitaliy 🔽 🖨 🛍 🖷
Data File Program DAQ	10_10_4.bin 10_80.bin 10_80.bin 10_80_4.bin 10_80_4.bin 12Hz_2sec25.bin 12Hz_2sec5.bin 12Hz_2sec_1.bin
	File name: 10_80_4.bin Open
I Enable Output	Files of type: Binary data files (*.bin) Cancel

Figure 4.6 Device Analog Output

4.2.5 Device GPS

The GPS menu can be used to check the status of the GPS receiver. Press the Get Position button and the screen will be updated with the latest serial message from the GPS receiver. The GGA string will show the data from the receiver. If valid GPS data is received, then the Latitude, Longitude, Altitude and time will be displayed.

Configuration - DAQ 2	X
Acquisition Weights Trigger Calibration Analog Output GPS ReTx	
GGA String	
\$GPGGA,195630.00,3647.08325,N,09656.08207,W,1,07,1.1,349.9,M,-26.6,M,,*52	
Lat: 36° 47.0832' N	
Lon: 96* 56.0821'W	
Alt: 349.9M	
UTC Time: 19:56:30	
Get Position	
OK Cancel	

Figure 4.7 Device GPS

5 Program Operation

5.1 Acquisition

Select menu Acquisition->Start or click Select Menu Acquisition.

Text at the bottom of the screen will display the status of the acquisition

- Waiting- will be displayed when acquisition is started, but waiting for trigger
- Acquired N sec- will be displayed after trigger has occurred and program started receiving data
- **Processing** will be displayed at the end of acquisition

To stop acquisition in progress select menu Acquisition->Stop or click Stop button or Press Ctrl T.

5.2 Projects

The VScope uses projects to save program settings and to store acquired data. The projects are like folders used to sort and store different data. Each project saves its own configuration for acquisition parameters, plot selection, scaling options, and other VScope selections. Plus each project has its own database where the program keeps the saved data. This allows the user to have different settings for different jobs and quickly switch between them. The program remembers last project and loads it automatically on startup.

To create a new project click menu **File->New Project**. VScope will reset all its settings to default values and will create an empty database. The program will create a separate folder with the same name as a project and store new database and project file with extension *.vsp to that folder. To create a new project with the same settings as the current one select menu **File->Save Project**. Create a new folder for this project and type a new name for VSP file. All settings from the current project will be copied to a new one. Command Save Project does not store acquired data, only program configuration.

When VScope is started for the first time it creates a default project – Project1. To change the current project use **File->Load Project** menu and select a VSP file to load.

5.3 Database

5.3.1 Loading Data From Database

The VScope program has a built in database support. For this reason all of the data that acquired by the program is stored as records in a database rather than in separate files. This allows for greater flexibility with data manipulation, record searching and analysis.

The user can see all of the records in the current project database and select any record for analysis by clicking **Open** button or selecting menu **File->Open** (Ctrl O).

缭	🔅 Sweep Database						
🍫 🔍 🛠 🌹 🎹 🛃 🗊			Local		N 🖪		
	Index	Date	Time	Device	Record#	Length	Comment
	1	11/1/2001	2:53:58 PM	4	107	8	VS1 5-120
	2	11/2/2001	8:49:36 AM	3	46	8	VS1 5-120
	3	11/2/2001	8:52:08 AM	4	124	8	Vib Pro on VS1simulator 5-120 Hz 8 sec 50,000lbs target force
	4	11/2/2001	9:09:16 AM	4	132	8	Vib Pro on VS1simulator 10-400 Hz 8 sec 50,000lbs target force
	5	11/2/2001	9:10:27 AM	4	133	8	Vib Pro on VS1simulator 5-120 Hz 8 sec 50,000lbs target force
	6	11/2/2001	9:37:08 AM	4	145	8	Vib Pro on VS1 simulator 5-120 Hz 8 sec 50,000lbs target force

Figure 5.1 Database Explorer

All records in a Database window are arranged into a table. It shows the following columns:

- Index - Number used to index the database. It is incremented every time a data record is stored:
- **Date** Date when data was stored to database: •
- Time Time when data was stored to database; •
- **Comment** Comment for data record. When recording and saving data to database • automatically, comment from previous record is copied to current record.

Toolbar buttons at the top of Database window help to find particular record.

Sort Records– Allows to select a column in the table, which will be used to sort records.

Search – Allows to search a record using Index, Date, Device or Record #.

Search in Comment – Helps the user to find a record, which has some word combination in the Comment column.

Range – Shows only records that lie withing some range (eg. betweet two dates).

Filter – Allows to set complex criteria for records to be shown in the table (Not implemented yet).

Show All Records – Cancels all ranges and filters and allows the user to see all records in the database.

Additional buttons

Edit Comment (Ctrl E) – Use this button to view or edit the comment

Delete (Del) – Use this button to delete data record from database

Local S 🛃 Connect toolbar

is used to access data local or over a network. To access data over the network replace Local with the IP address of the computer to be accessed. Both computers must be running the VScope program for this feature to work. Press

Connect to Database button.

Button **Find Database on the Local Network** allows searching for another computer running VScope and connected to the same LAN. In this case the user can connect to remote computer even if he does not know its IP address. The Find Database feature does not work over Internet.

To find out computer IP address run "ipconfig" program in the Command Prompt window on the Windows NT, 2000 computer or "winipcfg" on Windows 98.

5.3.2 DAQLink and Channel Configuration

The DAQLink Configuration and the Channel Configuration for the saved data can be shown by clicking the "DAQ Configuration" and the "Channel Configuration" buttons. The DAQLink Configuration shows the acquisition parameters for each DAQLink used in the selected record, also the GPS data will be shown if available. The Channel Configuration shows each channels setup for the DAQLink unit selected in the DAQLink Configuration.

The DAQ Configuration includes the following information

- Serial # Each DAQ Link has a unique device serial number. This number is stored to database to provide a unique identification for each record;
- **Record#** Each DAQ Link unit increments a counter every time it acquires data. This record number along with the device # provides a unique identification for each record.
- Acquisition Time Length of record in seconds;
- GPS Data Latitude, Longitude, Altitude and Time from the GPS receiver

🏶 Data	bas	e Expl	orer -	Local Data	abase												_0_
Record	Edit	t Viev	Rei	mote													
h 🖒		10	\$	z 😤 🎹 (م 9 ۵	۶,	<u>:</u> 🖳 2	•									
Index		Da	ite	Time	Comment		DAQ N	ame	Serial #	Acquisition Time	Sample Interva	I Recor	d#	RM Weight	BP Weight	HD Weight	Lat :
	1	10/28/	2002	5:26:00 PM	Geotest		DAQ 12		1:	2 6	0.9	5	1068	1000	1000	10000	
	2	10/30/	2002	12:33:11 PM	4 GS-100												
	3	10/30/	2002	12:33:48 PN	4 GS-100												
	4	11/13/	2002	4:44:34 PM	Floating P												
	5	11/26/	2002	2:03:57 PM	2 boxes												
	6	11/29/	2002	3:03:44 PM	2 boxes 3	-1											Þ
	7	11/29/	2002	3:05:34 PM	2 boxes 3-	_	Chan ‡	: [Name	Type	6	Gain	DC			1
L	8	11/29/	2002	3:03:44 PM	Sample C			1 Ch	an 1			5	1(0 0			1
								2 Ch	ian 2			5		1 0			Ī
												-					
L						•											
					•												
DAQ	Con	nfigurati	on	Channe	l Configuratio	on									/ s	how	🗙 Close
				1 clianne	. sonngaraa												

Figure 5.2 DAQLink and Channel Configuration

5.3.3 Import and Export Data

The import and export functions located in **File** menu allow for data to be exported or imported to different projects or to different applications. The VScope currently offers the option for the following import and export files

- VScope data files (*.vs2) use this selection when moving data from one project to another, or from one computer running the VScope program to another.
- Space delimited files (*.csv) use this selection when importing or exporting file to third party software such as spreadsheet software (e.g. Microsoft Excel and so on).
- Sercel VQC88 files (*.dat) use this selection when importing or exporting data to be used on Sercel VQC88 analysis program.
- Pelton Force Meter Files (*.fmr) use this selection when importing or exporting data to be used with the Pelton Vibrator Quality Control System
- SEG Y Tape format (*.sgy) use this to import or export data to the standard SEG-Y Tape Format
- SEG II format (*.sg2) use this to export data to the standard SEG-II Format

While in the Database Explorer multiple records can be exported to SEG-Y, or SEG-2 format. First select the records to be exported by highlighting them using the left button and the "ctrl" left button. After the desired records are selected use the pull down menu Record – Export to select the export function.

ŀ	🔅 Databas	e Explorer -	· Local Datal	base	Save As						? ×
-	Record Edi		z 😤 🎹 C	۶ \$	Save in: 🔂	Vitaliy	•	← 🖻	d ř		
ſ	Index	Date	Time	Con							
ĺ	1	10/28/2002	5:26:00 PM	Geo							
I	2	10/30/2002	12:33:11 PM	GS-							
	3	10/30/2002	12:33:48 PM	GS-							
ĺ	4	11/13/2002	4:44:34 PM	Floa							
	5	11/26/2002	2:03:57 PM	2 Ы							
	6	11/29/2002	3:03:44 PM	2 Ы							
	7	11/29/2002	3:05:34 PM	2 Ы	F 1	r					_
	8	11/29/2002	3:03:44 PM	San	File hame:	1				Save	•
					Save as type:	Vibrascope data files Ver.2 (*.vs2)		•		Canc	el
						Comma Separated values (*.csv) Sercel VQC88 files (*.dat) Pelton FMR files (*.fmr) SEG-Y Tape Format (*.sgy)					

Figure 5.3 Exporting data with Database Explorer

While in the database explorer, all records can be selected by pressing ctrl A (or go to Edit- Select All Menu).

After selecting all of the records, you can eliminate records that you do not want to export. Move the mouse to the record that you would like to omit from the list. Hold the ctrl button and press the left mouse button once. Then go to the next record to omit and hold the ctrl key and press the left mouse button. Continue until all of the records to be omitted have been selected.

After selecting all the records, go to the Record – Export menu, to export the selected records.

Pressing the left mouse button once will unselect the record from the list. The record will show highlighted until another record has been selected.

Doing a double click of the left mouse button will select the stack function.

Holding the ctrl button and pressing left mouse once will unselect record, holding ctrl button and pressing left mouse button again will reselect the record.

When storing multiple records to the VScope data files (*.vs2), all of the selected records will be stored to one *.vs2 file. The multiple record *.vs2 file can only be loaded while in the database explorer menu. Use the Records –Import menu to load the *.vs2 file.

When storing multiple records to SEG-Y or SEG-2 file format, each selected record will be saved to a different file name. The name that is entered in the "save as" window will be used along with the record # to create the file name.

5.3.4 Storing Data to Database

After acquisition is finished you can save new data to database. Select menu **File->Save** (Ctrl S). A window will appear where you can enter a comment for current record. By default this window displays a comment from the last record in the database.

5.3.4 Stacking Data

While in the Database menu, multiple records can be stacked together. Select the records to be stacked by pressing the "Ctrl" key and clicking the left mouse button. After the records to be stacked have been selected, press the "Show Stacked" button in the bottom right hand corner of the screen. The selected records will be added together and can now be viewed. Press the File – Save button to save the stacked data to the database.

🏶 Databas	e Explorer -	Local Data	base 📃 🗆 🗶
Record Edil	t View Rer	note	
h 🕒 🛛	1 🛈 🍫	z 😤 🎹 🤇	R R 🖉 🔳 🖪 🤜
Index	Date	Time	Comment
1	2/5/2003	2:21:56 PM	One hit with hammer UNLV 4 Hz phones
2	2/5/2003	2:26:14 PM	One hit with hammer Gain =100 is clipped UNLV 4 Hz phones
3	2/5/2003	2:58:49 PM	One hit with hammer trigger with hammer switch Gain =100 is clipped UNLV 4 Hz phone
4	2/5/2003	3:01:56 PM	12-13 One hit with hammer trigger with hammer switch Gain =100 is clipped UNLV 4 H:
5	2/5/2003	3:03:29 PM	12-13 One hit with hammer trigger with hammer switch Gain =100 is clipped UNLV 4 H:
6	2/5/2003	3:03:44 PM	12-13 One hit with hammer trigger with hammer switch Gain =100 is clipped UNLV 4 H:
7	2/5/2003	3:04:00 PM	12-13 One hit with hammer trigger with hammer switch Gain =100 is clipped UNLV 4 H:
8	2/5/2003	3:05:05 PM	12-13 One hit with hammer trigger with hammer switch Gain =100 is clipped UNLV 4 H
9	2/5/2003	3:09:00 PM	2.5 feet from 1 One hit with hammer trigger with hammer switch Gain =100 is clipped UN
10	2/5/2003	3:09:59 PM	2.5 feet from 1 One hit with hammer trigger with hammer switch Gain =100 is clipped UN
11	2/5/2003	3:10:30 PM	2.5 feet from 1 One hit with hammer trigger with hammer switch Gain =100 is clipped UN
12	2/5/2003	3:11:28 PM	2.5 feet from 1 One hit with hammer trigger with hammer switch Gain =100 is clipped UN
13	2/5/2003	3:12:45 PM	2.5 feet from 1 One hit with hammer trigger with hammer switch Gain =100 is clipped UN
14	2/5/2003	3:16:39 PM	2.5 feet from 24 One hit with hammer trigger with hammer switch Gain =100 is clipped U
15	2/5/2003	3:17:24 PM	2.5 feet from 24 One hit with hammer trigger with hammer switch Gain =100 is clipped U
16	2/5/2003	3:17:42 PM	2.5 feet from 24 One hit with hammer trigger with hammer switch Gain =100 is clipped U
17	2/5/2003	3:18:17 PM	2.5 feet from 24 One hit with hammer trigger with hammer switch Gain =100 is clipped U
18	2/5/2003	3:18:39 PM	2.5 feet from 24 One hit with hammer trigger with hammer switch Gain =100 is clipped U
19	2/19/2003	1:26:41 PM	Unit shipped to UNLV on 2-19-03 Geophone noise/tap test
•			
DA <u>Q</u> Cor	nfiguration	C <u>h</u> annel	Configuration Show Stacked X Close

Figure 5.3 Exporting data with Database Explorer

5.4 Data View and Analysis

5.4.1 Graph plot types

Buttons on the toolbar and the **View** menu allow you to select from many ways of signal representation on the graph plot



The time window allows performing a spectrum analysis on a time window. An entry of 1 to 2 performs the spectrum on the data between 1 and 2 seconds. An entry of -1 to -1 performs analysis on the whole trace.

Correlation... Ctrl+F3 Select to display correlation, phase of correlation, envelope of correlation, or spectrum of correlation.

The correlation will be performed using the channel defined in the DAQ units type field = Reference. Other channels can be selected with the assigned reference pull down menu.

Wib Analysis... Ctrl+F4 Select Vib Analysis to do one of the following

- Phase
- Fundamental Output
- Peak Output
- Frequency versus Time of Sweep

The Vib Analysis routines use the channel defined in the DAQ unit type field =Reference. Other channels can be selected with the assigned reference pull down menu.

Distortions... Ctrl+F5 Select to display distortion analysis of signals

Harmonic Distortion uses the channel defined in the DAQ unit type field =Reference. The energy of the signal selected is computed for the 1^{st} , 2^{nd} , 3^{rd} , 4^{th} and 5^{th} harmonics of the Reference Signal.

Time Variant Spectral Analysis – Performs spectral analysis on small time windows of the selected signal. The resulting plots shows time in the x-axis, frequency in the y-axis, and amplitude in the z-axis. The z-axis can be changed by the user. Press the right mouse button on the display to access the axis menu. If the default z-axis is max =0 and min=-170, then the graph is displaying distortion that is 170 dB below the maximum. After changing the minimum to -60, the graph will then show the distortion that is between 0 and -60 dB. This is very useful in examining distortion levels.

Compare... Ctrl+F6 Select to compare two signals. Used to compare accelerometer amplitude and phase.

The same selections are available in the plot popup menu. On any plot press the right mouse button to bring up the plot menu.

Axis Full View	
Store Plot View Stored	
Signal Traces Spectrum Correlation Vib Analysis Distortion Compare	

Figure 5.4.1 Plot Popup Menu

Show Legend –enables and disables the text legend at the bottom of the plot.

5.4.2 Store Plot Menu

Store Plot – allows the current plot to be saved to memory and viewed later as an overlay to another signal. The first trace in a plot will be stored. The color and name of each stored plot can be changed in the Store Plot Menu. The stored plot data can be saved and later loaded from disk with the Save and Load buttons in the Save Plot menu. The store plot menu is used to compare data using the same sample rate. Data acquired using different sample rates will not be displayed correctly.



Figure 5.4.2 Store Plot Menu

View Stored – used to retrieve the saved plots in memory.

5.4.3 Seismic Plots

There is an additional option for a Seismic Plot. When the signal traces plot is selected, the Seismic Plot option can be selected. The plot can be either Horizontal or Vertical. The normalize selection applies a very fast AGC automatic gain control to each trace.



Figure 5.5 Vertical Seismic Plot – The x-axis shows "Trace #"

The Seismic Plots use special keys to control the gain and traces separation. The normal Zoom and axis control used in the other plots do not work well with the Seismic plot

The "+" key on the numeric keypad – increases gain of each trace The "-" key on the numeric keypad – decreases gain for each trace The "Ins" key increases separation between traces The "Del" key decreases separation between traces

5.4.4 Setting Zoom Level

🔍 Full View

Zoom buttons on the toolbar and the View menu help to adjust a view of a selected plot

Axis... Ctrl+X Allows changing of the x and y axis of the plot.

Ctrl+F Zooms out completely to show all of plot.

To adjust zoom with the mouse press the left mouse button and make a box to zoom in on an area of the plot. Start at the top left corner and move to the bottom right corner.



Figure 5.6 Zooming In With The Mouse

After releasing mouse button the plot will zoom in. After zooming in, making a box with the mouse from bottom right to top left will zoom out.

The plot position can be changed by clicking and holding right mouse button and dragging plot in desired direction.

5.4.5 Additional Plot Functions

🗋 New Plot	Ctrl+N	Opens a new plot window
S Invert	Ctrl+I	Toggles inversion of accelerometer signals –status of inversion can be shown in the Plot info window at the bottom of the screen.
🎇 Smooth	Ctrl+M	Toggles selection of the smooth plot feature. Status of this bit can be shown in the Plot info window at the bottom of the screen.
🛃 Remove DC	Ctrl+D	Toggles selection of the remove DC feature. When enabled this feature removes the DC component from the input signal before plotting or analyzing data. Status of selection is shown in the Plot info window at the bottom of the screen.

5.4.6 Filters

High Cut, Low Cut and Notch filters can be setup and selected. The Tool bar can be used to select or unselect each filter. If the Toolbar button appears pressed in then the filter is selected.

The setup for each filter can be found under the pull down menu Option – Preference. The pass band, and stop band frequencies for the Highpass and Lowpass filters can be set. The Notch Filters Center Frequency and the width can also be set.

Preferences	×								
Display Settings Auto Operati	on Filters								
Lowpass Filter									
Pass Band, Hz	100								
Stop Band, Hz	150								
Highpass Filter									
Stop Band, Hz 5									
Pass Band, Hz	10								
Notch Filter									
Center Frequency, Hz 60									
Width, Hz	20								
🗸 ок	🗙 Cancel								

Figure 5.7 Filter Selection

5.4.7 Display Settings

The Display Settings menu allows the user to select either the A/D units (Volts), or some other display unit which was setup in the DAQLink configuration. For normal Seismic operation A/D units should be used

Preferences	X								
Display Settings Auto Operation Filters									
Units									
A/D Units									
🔿 Display Units									
Override Stored Weights									
Weights									
Reaction Mass 1000									
Base Plate 1000									
Hold Down 10000									
OKK Cancel									

Figure 5.8 Display Settings

5.4.8 Auto Operation

Auto Operation menu allows the user to setup the following automatic operations

- Auto Start Acquisition After the data is acquired from all of the selected DAQLink units, the program automatically sends a new start command out to the selected units.
- Auto Save to Database After the data is acquired from all of the selected DAQLink units, the data is automatically saved to the database with the comment that is in memory.

Preferences X
Display Settings Auto Operation Filters
Auto Start Acquisition
🦳 Auto Save To Database
V OK Cancel

Figure 5.9 Auto Operation

5.5 Status information Tabs

The Status information tabs at the bottom of the main window provide useful information about the current operation of the system.

5.5.1 Comment

The Comment tab shows the current comment for the record

Comment	Sweep Info	Plot Info	Status	Errors	Communication
Sample Co	mment				

Figure 5.10 Comment

5.5.2 Sweep Information

The Sweep information tab shows important information about the record.

Comment	Sweep Info	Plot Info	Status	Errors	Communication
Acquired: DAQ unit: RMW: 100 Length: 2s Resolution DAQ unit: RMW: 100 Length: 2s Resolution	11/26/2002 2: 2, 'DAQ 2' J0lb, BPW: 10(ec, Sample Int : 24bit 1, 'DAQ 1' J0lb, BPW: 10(ec, Sample Int : 24bit	12:43 PM DOID : 1msec DOID : 1msec			

Figure 5.11 Sweep Information

5.5.3 Plot Information

The plot information tab shows the status of the plot selections for the current record.

Accelerometer Signal Inverted: Yes Smoothed Plots: No DC Removed: No Lowpass Filter: OFF Highpass Filter: OFF Notch Filter: OFF	Comment Sweep Info	Plot Info	Status Errors	Communication
	Accelerometer Signal Inv Smoothed Plots: No DC Removed: No Lowpass Filter: OFF Highpass Filter: OFF Notch Filter: OFF	erted: Yes		

Figure 5.12 Plot Information

5.5.4 Status

The Status tab shows the status of the DAQLinks connected to the system. This is very useful in troubleshooting wireless Ethernet connections.

DAQ 2 - START received DAQ 1 - START received DAQ 2 - receiving data DAQ 1 - receiving data DAQ 2 - finished DAQ 1 - finished	Comment	Sweep Info	Plot Info	Status	Errors	Communication
	DAQ 2 - ST, DAQ 1 - ST, DAQ 2 - rec DAQ 1 - rec DAQ 2 - fini: DAQ 1 - fini:	ART received ART received eiving data eiving data shed shed				

Figure 5.13 Status

5.5.5 Errors

The Error tab shows any communications error or error detected by the DAQLink unit. If an error occurs this tab is automatically displayed.

5.5.6 Communication Tab

The communication tab shows the current status of the DAQLink units that have been selected in the DAQLink setup menu. This is useful when using the wireless Ethernet option.

Comment Sweep Info Plot Info Status Errors	Communication
DAQ 6 - Disconnected DAQ 11 - Disconnected	
<u> </u>	

Figure 5.14 Communication

6 Specifications and Options

6.1 Options

The DAQLink unit has several options

- Compact Flash The Flash card is used for
 - Buffering of data- Temporary storage of data until data can be sent over network. Amount of storage required depends on the speed of acquisition and the speed of the network
 - Storage of data while not connected to network. The Flash card can be used to store data while the unit is not connected to the network, later this data can be downloaded to the computer.
 - Storage of D/A output data
- GPS option The GPS option is used for
 - Position information When valid position data is available form the GPS receiver the position information is stored along with the data.
 - Timing The GPS receiver can be used to stored precise time of the data collection
 - Oscillator adjustment- The internal oscillator of the DAQLink unit can be adjusted to match the GPS clock.
- A/D boards
 - Version 1 A/D boards maximum voltage is plus and minus 10 volts, and are made to compensate for the accelerometer's 10 volt DC bias
 - Version 2 A/D boards maximum of plus and minus 12.5 volts and are made for small DC offsets found when using geophone inputs.
- Analog Cables
 - The DAQLink II unit has a 55 pin connector for the analog inputs. Various analog cable options are available for the end user.
- Power and Ethernet Switch Box
 - $\circ~$ This option allows multiple boxes to be connected over the Ethernet cable
 - This option can also be used between boxes to increase the maximum distance between boxes. The standard specification for transmission of data over CAT5 cable is 100 meters.
- Wireless Ethernet Option
 - Wireless Work group bridges and Wireless access points can be used to transmit the data from the DAQLink unit to the host computer
 - $\circ~$ High Gain antenna are available to increase the range of the Wireless network

6.2.2 DAQLink II

Specifications:

Configuration: 6, 12, 18, or 24 channels in each DAQLink II unit. Multiple units can be connected to achieve many channels.

Maximum Channels per box:

6 channels at 0.0625 msec sampling
24 channels at 0.125 msec sampling
24 channels at 0.250 msec sampling @ 2 times over sampling
24 channels at 0.5 msec sampling @ 4 times over sampling
24 channels at 1.0 msec sampling @ 8 times over sampling
24 channels at 2.0 msec sampling @ 16 times over sampling

A/D conversion: Uses Burr-Brown ADS1254 24 bit A/D converters with oversampling, digital filtering, and decimation to maximize signal quality.

Dynamic Range: 144 dB system; 115 dB measured @ 8 millisecond sampling @ G= x1

Bandwidth: DC to 4 KHz with version 1 analog cards

Common Mode Rejection: > 100 dB

Cross-feed Isolation: >90 dB

Noise Floor: 0.2 uvolt RMS at X100 gain typical

Maximum Input Signal: ± 1.2 volt at X1 gain

Input Impedance: 20 Kohm, 20 picofarad

Preamplifier Gain: x1, x10, x100

Filter: Digitally selectable filter depending on sample rate. Analog Filter version 2 card: -3 dB @ 800 Hz; -47 dB @ 2000 Hz; -120 dB @ 8000 Hz

Display Filters: *User selectable, Notch, High Cut, Low Cut

Sample Interval: 0.0625, 0.125, 0.250, 0.5, 1.0, 2.0, 4.0, 8.0 msec

Correlation: Performed by Host Computer Program

Record Length: User Selectable

Data Storage: Data stored on Compact Flash Card in the DAQLink unit. Compact Flash is currently available up to 1 Gigabyte per unit.

Pre-trigger data length: User selectable (up to 32000 samples)

Delay: User selectable

Transmission: Uses standard Ethernet transmission of data to host computer. This can be done via standard CAT 5 copper (250 meters maximum), or multimode fiber optic cable (1500 meters maximum), or using wireless access point radios (distance depends on terrain and antenna type used). Fiber optic and wireless mode are options and require additional hardware.

Instrument Tests: Built in noise test and external lab quality test available

Data Format: Host computer allows storage of data in SEG-Y, SEG-2 or ASCII format.

Auxiliary Channels: Any Channel can be set to Aux or Data

Roll Along: No roll box required

Line Testing: Real time noise monitor

System Software: Unit comes with Host Computer Operating Software. Software provides full support to setup unit for autonomous or real-time operation. Software also provides viewing of data in the time and frequency domain. Software includes the following features; built in stacking, amplitude spectrum, database storage, correlation, and trace comparison.

Data from multiple units are downloaded and sorted by the host software.

Data Storage: Stores Data internally in DAQLink II unit on compact Flash card. Also, stores data on Laptop PC

Plotters/Printers: Uses Windows compatible plotters and printers

Hardware Triggering: Positive, Negative, with software adjustable level. Also contact closure is available.

Software Triggering: User selectable event triggering allows DAQLink to continuously monitor analog channels and record data when a set trigger level is exceeded. Unit automatically stores the data recorded before and after the trigger event. The user selects both the pretrigger and post trigger times.

Timing: Each DAQLink unit has internal real time clock. When connected to optional GPS unit. The clock and the internal oscillator are synchronized to GPS time. The real time clock provides time stamp for each triggered event.

Power: 11-37 VDC inputs, reversed voltage accepted

Dimensions: 3x5.6x11in (76x144x280mm)

DAQLink II System

Weight: 3 lbs (1.4 Kg)

7 Schematics

7.1 DAQlink Connector wiring

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

3 pin trigger Connector A– TB active – A B– TB return (GND)– B C- +12 volt through 5 Kohm resistor

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.

When using the ST-01 trigger switch, connect Pin A to Pin C and to the High voltage side of the ST-01 switch. Connect pin B to the Low voltage side of the ST-01 switch.

Power 2pin 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.

Ethernet – 10 base T

Standard Patch cable to Computer

PT 22-55 connector

- A- Ch 1 pos B- Ch 1 neg C- Ch 2 pos D- Ch 2 neg E- Ch 3 pos F- Ch 3 neg G- Ch 4 pos H- Ch 4 neg J- Ch 5 pos K- Ch 5 neg L- Ch 6 pos M- Ch 6 neg N- Ch 7 pos P- Ch 7 neg R- Ch 8 pos S- 6 - Ch 8 negT- 7 – Ch 9 pos U- 8 - Ch 9 negV- 9 - Ch 10 pos W- 10 – Ch 10 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 negf- Ch 15 pos g-Ch 15 neg h - Ch 16 posi - Ch 16 negj – Ch 17 pos k - Ch 17 neg m - Ch 18 pos n - Ch 18 negp – Ch 19 pos q - Ch 19 negr - Ch 20 pos
 - s Ch 20 pos
 - t Ch 21 pos
 - u Ch 21 neg

v- Ch 22 pos w- Ch 22 neg x- Ch 23 pos y- Ch 23 neg z- Ch 24 pos AA- Ch 24 neg

D/A wiring

CC – Aout GG – Aout FB HH - GND

7.2 DAQlink panel wiring

20 pin header

1 – Ch 3 neg	F
2 – Ch 1 neg	В
3 – Ch 3 pos	Е
4 – Ch 1 pos	А
5 – Ch 2 neg	D
6 – Ch 2 pos	С
7 – Ch 5 neg	Κ
8 – Ch 5 pos	J
9 – Ch 6 neg	Μ
10 – Ch 4 neg	Н
11 – Ch 6 pos	L
12 – Ch 4 pos	G
17 – Aout	CC
18 – AoutFB	GG
19 – GND	HH

Power LED

X8 pin 3 is positive X8 pin 4 is negative

3 pin trigger Connector

X7 pin 1 – TB active – A X7 pin 2 – TB return & X8 pin 4 (GND)– B +12 volt through series 5 K - C

Power 2pin MS to X9 connector

X9 pin 1 - +battery – A X9 pin 2 – negative battery - B

Ethernet – 10 base T crossover

- 1 32 - 63 - 1
- 6 2

40 pin header

N P R S T U V

3 – Ch 7 pos	
4 –Ch 7 neg	
5 – Ch 8 pos	
6 – Ch 8 neg	
7 – Ch 9 pos	
8 – Ch 9 neg	
9 – Ch 10 pos	
10 - Ch 10 neg	W
11 – Ch 11 pos	Х
12 - Ch 11 neg	Y
13 – Ch 12 pos	Ζ
14 - Ch 12 neg	a
15 – Ch 13 pos	b
16 – Ch 13 neg	с
17 – Ch 14 pos	d
18 - Ch 14 neg	e
19 – Ch 15 pos	f
20 – Ch 15 neg	g
21 – Ch 16 pos	h
22 – Ch 16 neg	i
23 – Ch 17 pos	j
24 – Ch 17 neg	k
25 – Ch 18 pos	m
26 – Ch 18 neg	n
27 – Ch 19 pos	р
28 – Ch 19 neg	q
29 – Ch 20 pos	r
30 – Ch 20 neg	S
31 – Ch 21 pos	t
32 – Ch 21 neg	u
33 – Ch 22 pos	v
34 – Ch 22 neg	W
35 – Ch 23 pos	Х
36 – Ch 23 neg	У
37 – Ch 24 pos	Z
38 – Ch 24 neg	AA