



VTK Series CPTSND Software Manual

For use with VTK DataPack 2010 or VTK 2011 Modular DataPack system











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1. SECTION I

1.1. Introduction

The VERTEK DataPack System is an advanced platform for the acquisition of Cone Penetrometer (CPT) data. The system allows the user to perform CPT tests with minimal effort and learning. The CPTSND software was designed to give the operator maximum feedback from the cone in a simple, readable format.

This manual is to be used as a guide to allow the user to set up and use the Vertek Datapack System and CPTSND software for the acquisition of CPT data. It is not intended to be a primer on the proper interpretation of CPT data. There are many different standards for the interpretation of CPT data and an attempt to tutor the user in ASTM standards is beyond the scope of this manual.

- 1.2. System Requirements
 - Laptop computer running Windows 7 (64 bit PRO edition recommended)
 - Compatible with newer versions (Windows 8.1 & 10 may require additional drivers)
 - CPTSND Software for the laptop
 - VTK DataPack system, (Suitcase or Modular version--See the front cover)
 - Figure 1 Speed Lock One Meter Rods
 - Figure 2 CBL-0030-50M Cable Assembly
 - Figure 3 4444 Cone Assembly Or Other
 - Figure 4 2537 Depth Transducer Pictured is a string pot
 - Figure 5 1074 Depth Transducer Cable assembly
 - Figure 6 HT-0595 Power Supply
 - Figure 7 Rod Push/Pull System Figure
 - Other components may be included as ordered



Figure 1 Speed Lock One Meter Rods



Figure 3 4444 Cone Assembly Or Other



Figure 5 1074 depth cable assembly



Figure 2 CBL-0030-50M Cable Assembly



Figure 4 2537 Depth Transducer



Figure 6 HT-0595 power supply



Figure 7 Rod Push/Pull System -- Universal Push System Shown

2. SECTION II

2.1. SOFTWARE INSTALLATION

The DataPacks in the VTK series of equipment have an internal storage card that has the installation software package loaded on it. If loading from this device plug in the USB cord and proceed as below.

If using the installation CD provided then there is no need to connect the DataPack USB cord to computer until instructed.

Current versions of VERTEK software for CPT are available on our website (www.vertekcpt.com)

With the USB Cable unconnected, insert the Vertek software installation disk into the laptop disk drive. When prompted open the main folder. Select "Double click to install programs.rtf" then follow the instructions. For computers that cannot open .rtf files use the .html file of the same name.

To install the programs directly follow these instructions.

- 1. Double click on the "CPTSND.exe" program and follow the prompts.
- 2. Check the box to make a desktop icon then click "Next".
- 3. In the next prompt box click "Install".
- 4. After the installation the next prompt appears with a checked box to launch the CPTSND software, un-click the box.

Next click on the "Coneplot installer.exe" program.

- 1. When the install wizard appears click "Next".
- 2. Click "Next" at the following two prompts as well.
- 3. At the next prompt click the "Create icon" box then click on "Next".
- 4. At the next prompt click "Install" and wait for the next prompt.
- 5. At the last prompt un-click the "Launch" box and return to CD drive window.

It is recommended to also copy the manuals folder to the computer used for data collection for operator reference.

If the hard drive space is available, copy the entire CD to a backup folder. There is also a backup copy of the software disc on file in the DataPack.

NOTE: Direct installation of the programs alone may not work on all computers as our software requires certain background programs to be on the computer; standard versions of these are on the installation disc. (Dot Net is required, as is Measurement Computing's INSTACAL, along with drivers for the serial devices) Some computers may require downloading correct versions of these in order to operate.

3. SECTION III

3.1. SERIAL PORT HARDWARE SETUP

The laptop is now ready to connect to the DataPack system via the USB cable. See section IV for system wiring connections. The Wizard screen below or a similar one will appear depending on the version of operating system, Figure 8 Hardware Wizard Screen. This may take several minutes as Windows finds the new devices.



Figure 8 Hardware Wizard Screen

- 1. The following screen will appear. Select "Install from a specific location" option, Figure .
- 2. Select "Next".



Figure 9 Software Install Choice

3. Select the search option as shown in Figure then click Next

4. Figure // shows search installation options. Check both boxes and browse to the location the installation disc is inserted into.

nd New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
E:\new HT jun 2012\Windows 2000, XP, Vista Quat 💌 Browse
C Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< <u>B</u> ack <u>N</u> ext > Cancel

Figure 10 Search Installation Options

5. The following screen (Figure 11) will show up informing you that the serial port hardware has been successfully installed. Select "Finish"



Figure 11 Installation Complete

4. SECTION IV

4.1. SYSTEM HARDWARE SETUP

Setting up the acquisition system is simple. There is only one USB connection to the computer, see pictures below for basic systems connections:



Figure 12 Picture of DATAPACK 2010SV with depth, cables and cone



4.1.1 Standard connections for DATAPACK 2010SV

Figure 13 VTK Datapack 2010SV Connections

- 1. The CPT cone cable (CBL-0030-50M or equivalent) plugs into the 'PROBE' receptacle. The other end is strung through the rods and connected to the appropriate cone (4444 or equivalent)
- 2. The Depth Cable Assembly (1074 or equivalent) is connected to the 'DEPTH' receptacle. The other end is connected to the depth transducer (2537 or equivalent)
- 3. The HT-0595 power supply is connected to the '12VDC IN' receptacle. The other end is connected to the appropriate AC power supply source.
- 4. The USBA to USBB cable is plugged into the 'USB TO PC' receptacle. The other end is connected to an open USB port on customer supplied computer.
- 5. The 'AUX' receptacle is used for peripheral devices like load cells or other optional equipment.

4.1.2 Standard connections for the Vertek Modular DataPack 2011 system (ENCL-0025 used with Connector Hub ENCL-0026):



Figure 14 Basic VTK Modular System



Figure 15 Front Connections ENCL-0025



Figure 17 Cone Cable and Datapack Cable to Connector Hub ENCL-0026



Figure 16 Rear Connections ENCL-0025



Figure 18 Depth Transducer

- 1. The CPT cone cable (CBL-0030-50M or equivalent) plugs into the 'CONE' receptacle on the connector hub. The other end is strung through the rods and connected to the appropriate cone (4444 or equivalent)
- 2. The Connector Hub Cable (35544) is connected between the 'CONNECTOR HUB' receptacle on the ENCL-0025 and the 'DATAPACK' receptacle on the Connector Hub (ENCL-0026)
- 3. The Depth Cable Assembly (1074 or equivalent) is connected to the 'DEPTH' receptacle on the Connector Hub. The other end is connected to the depth transducer (2537 or equivalent)
- 4. The HT-0595 power supply is connected to the '12VDC IN' receptacle. The other end is connected to the appropriate AC power supply source.
- 5. The USBA to USBB cable is plugged into the 'USB TO PC' receptacle on the ENCL-0025. The other end is connected to an open USB port on customer supplied computer.
- 6. The 'AUX' receptacle is used for peripheral devices like load cells or other optional equipment.

Connections for video and seismic will be discussed in the appropriate sections.



4.1.3 Connections for DataPack Modular System (ENCL-0025 without Connector Hub):

Figure 19 ENCL-0025 Modular DataPack used without Connector Hub

1. In this application the cone used plugs directly into the 'CONNECTOR HUB' receptacle on the ENCL-0025. Shown in figure 19 is a Specialty Module that connects to an orange cable which

then connects to adaptor cable # CBL-0180 which connects to the 'CONNECTOR HUB' receptacle. (NOT SHOWN-- For the "Mini Cones" the cables are 3185 and CBL-0141)

- 2. The Depth Unit (2537) connects to the Depth Cable (CBL-0150-15FT) which plugs into the 'DEPTH' receptacle on the ENCL-0025.
- 3. The power supply and the USB cable connect as for the standard modular system.



Figure 20 Rear Connections for DataPack without connector hub

4.2 SETTING UP THE SOFTWARE

The software has system specific use preferences that will initially need to be made by the user, such as the desired channel units.

To setup the software, start the computer and double click on the CPTSND icon. This brings up the main screen as shown in Figure 21

Notice		_		
	CP	TS	ND	
🔅 VERTER CP.1, 2014				- + *
SOUNDING	Module Sellings Module Placement	TESTID, N/A, OPERATOR, I	A	
FORGE:	3 IM 14 N FORCE:	-216 -9 N PSI 0.0	CPI S(ounding
U C			Softw	are for
A Division of AR	EK			dows
NE PENETROMETER	PRODUCTS		Vers	ion: 2.7.0
		Applie	d Research /	Associates, Inc.
0 TIME BETWEEN READINGS 14 CURRENT SOL BEFAVOR, 1975	T See 🔵 COMM STATUS TAKE BAGE	Vertek	Division	
SYSTEM SETUP / TROUBLESHOOT	0.00 m	0.250-cg = 5000-cm = 5	nville Road ph, VT 05060	
	0.00 m		02) 728-4588	REAPT D SEPATON UV ON
SPECIFY SYSTEM TYPE (HT/VTK)			02) 728-9871 ertekcpt.com	
	_			

Figure 21 CPT SND Software Main Screen

Click on SYSTEM SETUP. The system setup screen will appear as shown on next page in Figure 22.

Since this manual deals with the VTK series the "Specify System" button is not used. If the setup screen has been completed previously the settings are saved. Click on the "DETECT VTK DAS" button and skip to figure 29 on page ??

SETUP								A A
SetQuits Display Settings				ition	DETE	ECT ON STARTUP		DEPTH UNITS O meters O feet
SETUP MODU	ULE: 5 - 5		STATUS: N/A		DETE	CT ON STARTOP		
CHANNEL NAME	CHANN	NEL UNITS	SIG. DIGITS		AY DATA	TAKE BASELINE	RECORD CHANNEL	DEPTH TRANSDUCER SN 0
Tip	TSF	•	2 •	⊙ YES	O NO			O ENCODER/DIO CLAMP DEPTH COUNTER TYPE O ENCODER/DAS CLAMP
				⊙ YES	O NO			⊙ POTENTIOMETER
Sleeve	TSF	•	2 💌	O TES	O NO	<u>v</u>	(V)	ENCODER DIRECTION Down
Temperature	F	•	0 🗸	⊙ YES	O NO		\sim	ENCODER RESOLUTION 5 mm/step
Pore Pressure	PSI	•	2 •	⊙ YES	O NO	\checkmark	\checkmark	POTENTIOMETER OUTPUT
Exc Sense	V			⊙ YES	O NO			SET DEPTH (0 m) 1.15192
		-	2 •	-		_		SET DEPTH (1 m) 0.39651
Inclination X	Deg	•	2 🔹	⊙ YES	O NO	\checkmark	\checkmark	CLAMP CONFIGURATION Normally Open
Inclination Y	Deg	•	2 🔹	⊙ YES	O NO	\checkmark	\checkmark	O TIME PACED
HFFD	V	•	2 •	⊙ YES	O NO		\checkmark	SOUNDING RECORDING MODE
LFFD	1-			⊙ YES	O NO		M	DEPTH INCREMENT 20 mm
	V	-	2 🔹	-	-	_	_	TIME INCREMENT 1 second
N/A		-	0 👻	O YES	⊙ NO			DEPTH FORMAT Normal
Friction Ratio	%	•	2 -	⊙ YES	O NO			MODULE SERIAL PORT N/A -
SPT-N		-	2 -	⊙ YES	O NO			GPS SERIAL PORT N/A AUTO DETECT MODULE AND
				-	-			ASCII-OUT SERIAL PORT N/A N/A
Soil Behavior Type	ZONE	•	0 👻	⊙ YES	O NO			ENCODER SERIAL PORT
COMP	ANY NAME	VERTEK				QUITS ACTIVATED	Yes	*.DAT FILE FORMAT Coneplot
TIP PLO	T VALUES	Qc only	-		SOIL	BEHAVIOR CHART	R & C - 198	FILE NAMING Auto-Increment
PP GRA	PH STYLE	Linear	•		ON-	SCREEN HEADER 1	Test ID	VIDEO RECORDING MODE None (no frame grabber)
AUTO-ENHANC	E SEISMIC	No	•		ON-	SCREEN HEADER 2	Operator	▼ AUTO-SAVE DISSIPATION No ▼
AUTO-FILTE	R SEISMIC	No	-		VIDEO O	VERLAY (DEPTH+	Depth Only	
SHOW G	GRIDLINES	Yes	•			SAVE	CANCEL	ADD TRB AND TMP FILES Yes 💌

Figure 22 System Setup Screen

To change any of the settings, click on the drop-down box for that setting or enter the data directly if there is no drop-down box. The settings are described below: (NOTE: cone module 1 is for a non seismic cone and cone module 5 is for a seismic cone)

The SET UP MODULE area on the upper left side can be pre-set at the office. To ensure that the actual configuration is correct for modules found during set up it is best to verify the module set up section prior to testing. These settings will set up the display to work in the units desired. Take baseline and record channel are musts for some modules and therefore are grayed out.

DETECT ON STARTUP Selecting yes for only the cones/modules being used will speed up the search time considerably by having the system only look for the items being used. See figure 23.



Figure 23 Detect On Startup

On the upper right side are the depth transducer selection and settings. First is DEPTH UNITS, where the choice is made to display meters or feet. DEPTH TRANSDUCER SERIAL is just a location to note serial number and is stored for future reference.

DEPTH COUNTER TYPE- Select either POTENTIOMETER or ENCODER depending on your system. (The encoder requires a small additional USB circuit and will connect directly to the computer) The potentiometer cannot be set up (the black readouts next to 0 M and 1 M) until the system is connected and communicating and will take place the first time a test is run (see Sect 5).

ENCODER/DIO Clamp checked -- causes system to ignore the clamp switch – requires operator to manually cycle clamp indication to record data.

ENCODER/DAS Clamp checked – allows the system to collect data automatically using auto clamp active feature

If either ENCODER choice is selected the settings must be entered at this time. These settings cannot be changed after detecting the VTK DAS. Choose direction (UP or Down) in ENCODER DIRECTION to ensure that depth increments properly during test (depends on how the unit is mounted). Select the number

of millimeters of travel that the encoder makes per step in ENCODER RESOLUTION. This is important so that indicated depth matches actual depth!!! (encoders supplied by Vertek use a nominal 5 mm setting and this setting can be fine-tuned out to three decimal places to ensure accuracy.)

CLAMP CONFIGURATION This setting allows the software to accept either normally open or normally closed switches used to indicate clamp position. With no switch present the selection has no effect.

Then select either DEPTH INCREMENT or TIME INCREMENT. Depth Increment must be the same as, or a multiple of, the ENCODER RESOLUTION selected. The Time Increment choice is either continuous or 1 second. In continuous the interval is as close as possible limited by the TIME BETWEEN READINGS rate seen on the testing screen.

The increment setting determines the interval between data capture points during CPT push. Most users use 2 or 5 cm in depth or 1 second in time

On the set up screen there are four tabs in the top tool bar; one for 'Set Quits', one for 'Display Settings', one for 'Default Dissipation Mode', and one for 'Ball Tip Area Calculation'. See Figure 24.

The Display Settings are drop down menus, Mode is "indoor / outdoor" which simply changes the background for the push screen graphs between black and white. The other drop choices on 'Display Settings' allow the operator to select heavier or thinner graph or grid lines to aid in visibility during push.

SETUP				
SetQuits Display Settings Default Diss	ipation Mode Ball Tip Area Calc	ulation		
SETUP MOD	ULE: 1 - CONE			•
			STATU	S: N/A
CHANNEL NAME	CHANNEL UN	ITS	SIG.	DIGITS
Тір	PSI	•	3	•
Sleeve	PSI	•	2	•
Side Temp	C	•	2	•

Figure 24

SETUP						
SetQuits	Display Settings	Default Dissipat	ion N	lode	Ball Tip A	Area Calcula
	Mode	>	~	Indo	or	
	Data Line Th	hickness >		Outo	loor	
	Grid Line Th	nickness >				_
	HANNEL N	AME	_	CH	ANNE	

Figure 25 Display Settings

The Set Quits screen allows setting of the quits to a percentage of the cone rating or to a specific setting for each channel. A zero setting will result in no quits being generated. Quits can be entered differently for the start of a push (less than 5 meters) and for the remainder of the push (greater than 5 meters).

SET QUITS	7 F	ENCODER							
CHANNEL QUIT LEVEL (% OF CHANNEL CAPACITY OR ABSOLUTE VALUE): ENTER 0 FOR NO QUITS									
MODULE NUMBER 1 - CONE									
	DEPTH < 5m	DEPTH > 5m							
Тір	0 v or 0 PSI	0 v or O PSI							
Sleeve	0 v or 0 PSI	0 v O PSI							
Side Temp	0 _ or 0 N/A	0 _ or 0 N/A							
Pore Pressure	0 v O PSI	0 v 0 PSI							
Excitation Sense	0 or N/A	0 v 0 N/A							
Inclination X	0 v O Deg	0 🔽 or 0 Deg							
Inclination Y	0 v O Deg	0 🔽 or 0 Deg							
HFFD	0 v 0 N/A	0 v O N/A							
LFFD	0 v O N/A	0 v 0 N/A							
N/A	0 - or 0 N/A	0 v 0 N/A							
	SET QUITS CANCEL								

Figure 26 Quit Settings

NOTE: The settings on this page work in conjunction with the channel capacity settings on the module delay screen. Without channel capacity set, channel quit level settings will be irrelevant.

The Default Dissipation Mode allows user to choose continuous readings or dynamic. The continuous mode will make a very large file quickly and should be avoided when dissipations are expected to last a few hours. The One Second mode will take a reading each second (creating about one third the file size of the continuous) The dynamic mode takes readings at increasing intervals to accommodate long test cycles.

SETUP		
SetQuits Display Settings	Default Dissipation Mode	Ball Tip Area Calculation
SETUP MODU	Interval 🕨	One Second Interval DETECT ON
	Continuous	V Dynamic Interval
CHANNEL NAME	CHANNEL UNITS	SIG. DIGITS DISPLAY DATA BI

Figure 27 Dissipation Mode Selection

The Ball Tip Area Calculation simply allows choice on area of ball tip entered into calculations – entire area or half sphere area.

SETUP	_	Common and				
SetQuits	Display Settings	Default Dissipation Mode	Ball Tip Area Calculati	on	_	
	SETUP MODU	JLE: 1 - CONE	Cross Sectional A	Area	DETECT	ON :
		,	Half Sphere Area			т
CHA	NNFI NAMF	CHANNEL UNITS	SIG. DIGITS	DISPI AY I	ΔΑΤΑ	RA

Figure 28 Ball Tip Area Selection

4.3 PORT SETTINGS

CPT SND now will determine what ports the data system has been assigned and will search for the selected modules simply by clicking on DETECT VTK DAS (see fig 21)

The following information is for reference purposes and troubleshooting. If the system is found (see figure 36) by clicking DETECT VTK DAS then skip to system set up on page 23.

The DAS Serial Port can be on any COM port (COM4 is shown in our example below figure in Device Manager -- USB serial port (COM4) and SSU2-100 device listed in multiport adaptors) Renaming ports should not be necessary. Additional devices will be assigned as detected.



Figure 29 Device Manager Screen

The AUTO DETECT MODULE AND ENCODER PORT button (see figure 22) will start a search for the DAS and display this:



Figure 30 Auto-Detect notice

Figure 31 Detect Encoder notice



SETUP			_							
SetQuits Display Settings										
SETUP MODU	JLE: 5 - S	EISMIC CONE			DETE	ECT ON STARTUP			DEPTH UNITS	O meters ⊙ feet
			STATUS: N/A			TAKE	RECORD		DEPTH TRANSDUCER SN	0
CHANNEL NAME	CHANN	IEL UNITS	SIG. DIGIT	<u>S</u> <u>DISPL</u>	Y DATA	BASELINE	CHANNEL			O ENCODER/DIO CLAMP
Tip	TSF	-	2 🗸	1	-	\checkmark	\checkmark		DEPTH COUNTER TYPE	 ○ ENCODER/DAS CLAMP ③ POTENTIOMETER
Sleeve	TSF	-	2 🗸	⊙ YES	O NO	\checkmark	\checkmark		ENCODER DIRECTION	Up 💌
Temperature	F	-	2 💌	O YES	^ NO				ENCODER RESOLUTION	5 mm/step
Pore Pressure	PSI	•	2 💌	⊙ YES		CHECKI		-	POTENTIOMETER OUTPUT	
Exc Sense	v	-	2 🗸	⊙ YE S			SYSTE	- MI	SET DEPTH (0 m)	0.17898
Inclination X	Deg	•	2 💌	⊙ YES			4		SET DEPTH (1 m)	3.16852
Inclination Y	Deg	•	2	CPTSND	0.00	_			CLAMP CONFIGURATION	· · · _
HEED	V	-	2	CPISND		-	-		NG RECORDING MODE	 ○ TIME BASED ③ DEPTH BASED
1.555						ETECTED ON PORT	4. CLICK OK T	O DETECT ENCODE	R DEPTH INCREMENT	20 mm
LFFD	V	•	2	PORT OR CA	ANCEL TO	STOP			TIME INCREMENT	1 second 👻
N/A		~	0						DEPTH FORMAT	Normal
Friction Ratio	%	•	2				(OK Can	IODULE SERIAL PORT	· · · · · · · · · · · · · · · · · · ·
SPT-N		•	2 -	⊙ YES	O NO			_	GPS SERIAL PORT	MODULE AND
Soil Behavior Type				i I⊙YES	O NO				ASCII-OUT SERIAL PORT	ENCODER PORT
Soli Dellavior Type	ZONE	-	0 🗸		O NO				ENCODER SERIAL PORT	
COMP	NY NAME	VERTEK				QUITS ACTIVATE	D Yes		*.DAT FILE	FORMAT Coneplot and ProDAT
TIP PLO	T VALUES	Qc only	•		SOIL	BEHAVIOR CHAR	T R&C-	1983	• FILE	NAMING Manual
PP GRA	PH STYLE	Linear	-		ON-	SCREEN HEADER	1 Test ID		 VIDEO RECORDII 	NG MODE None (no frame grabber) 💌
AUTO-ENHANCI	E SEISMIC	No	•		ON-	SCREEN HEADER	2 Operator		AUTO-SAVE DISS	
AUTO-FILTER	R SEISMIC	No	•		VIDEO O	VERLAY (DEPTH	⊦) Depth O	nly	SAVE SCREEN SIZE	ON EXIT No
SHOW G	RIDLINES	Yes	•			SAVE	CANCE	L	ADD TRB AND T	MP FILES Yes -

Figure 32 Checking for system notice

CPTSND	
VERTEK MODULE(S) DETECTED ON PORT 4. CLI PORT OR CANCEL TO STOP	ICK OK TO DETECT ENCODER
	OK Cancel

Figure 33 Modules Detected

CPTSND

If using potentiometer click cancel to not look for encoder / click OK if using encoder.

Figure 34 Encoder Found - With Potentiometer selected this will say Could not detect Encoder.

ENCODER SET UP The optional optical encoder can only be selected in the SYSTEM SETUP/TROUBLESHOOT screen (ref figure 21 & 22). This cannot be changed after detecting the VTK DAS.

Select ENCODER. Choose direction (UP or Down) in ENCODER DIRECTION to ensure that depth increments properly during test (depends on how the unit is mounted). Select the number of millimeters of travel that the encoder makes per step in ENCODER RESOLUTION. This is important so that indicated depth matches actual depth!!! (encoders supplied by VERTEK will use a nominal 5 mm setting that can be fine-tuned out to 3 decimal places to ensure accuracy)

Then select either DEPTH INCREMENT or TIME INCREMENT. Depth Increment must be the same as, or a multiple of, the ENCODER RESOLUTION selected. The Time Increment choice is either continuous or 1 second. In continuous the interval is as close as possible limited by the TIME BETWEEN READINGS rate seen on the testing screen.

The increment setting determines the interval between data capture points during CPT push.

	_								
SETUP									
SetQuits Display Settings	Default Diss	ipation Mode	Ball Tip Area Calcula	ition					
SETUP MOD	JLE: 1-0	ONE	•		DETE	CT ON STARTUP		DEPTH UNITS	O meters
			STATUS: N/A			TAKE	RECORD	DEPTH TRANSDUCER SN	0
CHANNEL NAME	CHANN	IEL UNITS	SIG. DIGITS	DISPLA	Y DATA		CHANNEL		O ENCODER/DIO CLAMP
Тір	PSI	•	3 💌	⊙ YES	O NO	\checkmark	\checkmark	DEPTH COUNTER TYPE	ENCODER/DAS CLAMP O POTENTIOMETER
Sleeve	PSI	-	2 🔻	⊙ YES	O NO	\checkmark	\checkmark	ENCODER DIRECTION	
Side Temp	C	-	2 🔻	⊙ YES	O NO		<i>V</i>	ENCODER RESOLUTION	M 5 mm/step
Pore Pressure	PSI	•	2 💌	⊙ YES	O NO	\checkmark	1	POTENTIOMETER OUTPU	
Excitation Sense	v	•	2 🔹	⊙ YES	O NO		\checkmark	SET DEPTH (0 m)	1.45683
Inclination X	Deg	•	1 •	⊙ YES	O NO	\checkmark		SET DEPTH (1 m)	0.48843
Inclination Y	Deg	-	1 •	⊙ YES	O NO	\checkmark	1	CLAMP CONFIGURATIO	
HFFD	v	•	1 •	⊙ YES	O NO		<i>V</i>	SOUNDING RECORDING MOD	O DEPTH BASED
LFFD	v	•	1 •	⊙ YES	O NO		~	DEPTH INCREMEN TIME INCREMEN	
N/A		-	0 -	O YES	⊖ NO			DEPTH FORMA	T Second
Friction Ratio	%	-	2 -	O YES	⊙ NO			MODULE SERIAL POR	Т 9 🔻
SPT-N		-	2 -	⊙ YES	O NO			GPS SERIAL POR	MODULEAND
Soil Behavior Type	·			O YES	⊙ NO			ASCII-OUT SERIAL POR	
Son Benavior Type	ZONE	•	0 -	0 165	0 NO			ENCODER SERIAL POR	T 43 🔽
COMP	ANY NAME	VERTEK			Q	UITS ACTIVATED) Yes	*.DAT FIL	E FORMAT Coneplot
TIP PLO	T VALUES	Qc only	-		SOIL E	BEHAVIOR CHART	R & C - 1983	FIL	E NAMING Auto-Increment
PP GRA	PH STYLE	Linear	-		ON-S	CREEN HEADER 1	Test ID	VIDEO RECORD	ING MODE None (no frame grabber)
AUTO-ENHANC	E SEISMIC	No	•		ON-S	CREEN HEADER 2	2 Operator	AUTO-SAVE DIS	SIPATION No
AUTO-FILTE	R SEISMIC	No	-		VIDEO O\	/ERLAY (DEPTH+	Depth Only	SAVE SCREEN SIZ	E ON EXIT Yes 🔹
SHOW 0	RIDLINES	Yes	-			SAVE	CANCEL	ADD TRB AND	TMP FILES Yes
	-								

Figure 35 Set up screen with encoder selected

Then click on AUTO DETECT MODULE AND ENCODER PORT. With an encoder connected a port should be found for MODULE SERIAL PORT and a separate one for ENCODER SERIAL PORT.

(CPTSND
0	AUTO DETECT COMPLETED
	ОК

Figure 36 Auto Detect Completed



If port is not found then verify the port assigned in Device Manager. Manually enter the port from Device Manager in MODULE Serial Port box (fig 32) and try again. If the DAS is still not detected contact the factory for assistance (800-639-6315 or 802-728-4588)

4.4 System Settings

Click OK and enter the information in the user selectable entries across the bottom of the set up screen (see Fig 32)

COMPANY NAME: To be displayed on data

TIP PLOT VALUE: to select either Qc & Qt or Qc only

PP GRAPH STYLE: to select either Linear or Logarithmic for dissipations

AUTO ENHANCE SEISMIC: Yes/No

FILTER SEISMIC: Yes/No

GRIDLINES: Yes/No for on screen graphs

QUITS ACTIVE: Yes/No (even with quits set to zero on Set Quits the system will generate a warning for excessive rate of change

SOIL BEHAVIOR CHART: to select from various chart/years

ON SCREEN HEADER 1 / ON SCREEN HEADER 2 to select from the dropdown which items to display on the test. See header on figure 37.

Gridlines Yes Quits Active? No Soil Behavior R & C - 1983 On Screen Header 1 Test ID On Screen Header 2 SAVE SAVE Crew Site Location Client Client Rep	Quits Active? No Quits Active? No On Screen Header 1 On Screen Header 2 SAVE SAVE Crew Site Location Client			
Soil Behavior R & C - 1983 On Screen Header 1 Test ID On Screen Header 2 SAVE SAVE Location Client Client Client Rep	Soil Behavior R & C - 1983 On Screen Header 1 Test ID On Screen Header 2 SAVE SAVE Location Client	Gridlines	Yes 💌	
On Screen Header 1 Test ID On Screen Header 2 SAVE SAVE Client Client Client Rep	On Screen Header 1 On Screen Header 2 SAVE SAVE Crew Site Location Client	Quits Active?	No	
On Screen Header 2 SAVE SAVE Location Client Client Rep	On Screen Header 2 SAVE SAVE Location Client	Soil Behavior	R & C - 1983 💌	
SAVE Client Rep	SAVE Client	On Screen Header 1	Test ID 💌	
Filename	Filename	1	Operator Crew Site Location Client Client Rep	

Figure 37 On Screen Header Drop Down Choices

VIDEO OVERLAY (+DEPTH): same options as Screen Header (for display on video stream if a vision module is used)

.DAT FILE FORMAT: drop down selection to allow file use with different plotting softwares.

FILE NAMING: select manual or auto-increment from the drop down

VIDEO RECORDING MODE: drop down selection for video file types (snapshots or movie capture) and allows for use with a camera module or older vision cone (no module 8)

AUTO-SAVE DISSIPATION: yes/no

SAVE SCREEN SIZE ON EXIT: yes/no (this saves the relative screen size on the computer display screen)

ADD TRB AND TMP FILES: yes in this box will have each test generate text data files that take readings every second (TRB) and every second when the depth transducer has activity (TMP)

After all the initial settings are made, press save. This returns to the main screen.

4.5 Detecting connected items

press 'DETECT VTK DAS'. The system will then look for ports & modules connected.

CPTSND (ARA, 2013)		
	CHECKING FOR VERTEK MODULE(S) ON PORT 0	
	Softwa	-
		are ior
A Division of CAR	CPTSND VERTEK MODULE(S) NOT FOUND ON SPECIFIED PORT. PLEASE CHECK CONNECTIONS, POWER AND SYSTEM SETUP. WOULD YOU LIKE TO SEARCH FOR THE PORT?	WS .0.30
	Yes No	ates, Inc.
,	250 Beanville Road Randolph, VT 05060 US	SA
SYSTEM SETUP / TROUBLESHOOT	Tel: (802) 728-4588 FAX: (802) 728-9871 www.vertekcpt.com	
EXIT	RESUME	DETECT VTK DAS

Figure 38 Looking for Modules

If the modules are not found on specified port click on yes and the system will find the correct port. Ports settings can change due to WINDOWS USB configuration issues.



Figure 39 Modules Detected

Once the port has been found click on OK to proceed with polling for connected modules. Once the system has checked all options it will then display a screen showing what it found. Note that you can check the cal factors from this screen to see the recorded data in the modules.

	MODULES		
M	ODULE 3: DATAPACK		
	erial Number: 18266-1.10		
S	ensor 3: Aux1 found		
S	ensor 3: Rod Depth found		
S	ensor 3: A Clamp found		
	SHOW CAL FACTORS		
M	IODULE 5: SEISMIC CONE		
	erial Number: 4444,144XX		
S	ensor 5: Tip found		
	ensor 5: Sleeve found		
S	ensor 5: Temperature found		
S	ensor 5: Pore Pressure found		
S	ensor 5: Exc Sense found		
	ensor 5: Inclination X found		
S	ensor 5: Inclination Y found		
	SHOW CAL FACTORS		
		OK	

Figure 40 Modules Found Screen

AL FACTORS FOR PROB	E: 2579.108US	former 2 Aug	Sec.				
	SENSOR 0	SENSOR 1	SENSOR 2	SENSOR 3	SENSOR 4	SENSOR 5	SENSOR 6
CHANNEL #	0	1	N/A	2	6	3	4
SENSOR LABEL	Tip	Sleeve	Temperature	Pore Pressure	Exc Sense	Inclination X	Inclination Y
CAL FACTOR 0	8.038680E-002	2.568190E-001	N/A	4.658940E+000	1.022000E+000	1.032400E+001	1.041400E+00
CAL FACTOR 1	1.000000E+000	1.000000E+000	N/A	1.000000E+000	1.000000E+000	1.000000E+000	1.000000E+00
CAL FACTOR 2	1.000000E+000	1.000000E+000	N/A	1.000000E+000	5.115000E+000	1.000000E+000	1.00000E+00
CAL FACTOR 3	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.00000E+00
CAL FACTOR 4	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+00
UNIT FACTOR 0	1.510000E+000	6.490400E+000	N/A	1.000000E+000	0.000000E+000	2.013000E+003	0.000000E+00
UNIT FACTOR 1	1.790000E+000	1.730000E+000	N/A	1.000000E+000	0.000000E+000	1.000000E+000	0.000000E+00
UNIT FACTOR 2	2.350000E+000	3.542000E+001	N/A	1.000000E+000	0.000000E+000	2.300000E+001	0.000000E+00
UNIT FACTOR 3	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+00
UNIT FACTOR 4	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.00000E+00
					ОК		

And this is what the SHOW CAL FACTORS tab will display

Press OK, after a short pause the sounding screen will be displayed. See figure 37 on next page.

SECTION V Preparing for, and Performing, a SOUNDING

5.1 About the test screens. This begins the TEST SETUP section. Following is a description of the screen items.

VERTEK CF	PT, 2016												\times
Test Setup	System Setup	Module Settin	gs Module	Placement Mon	itor Classifica	tion Co	mmunication	Delay R	am Settings	Verification Ex	it		
SOUNDIN	NG				TEST ID: N//								
	Тір	•		Sleeve	• 0.0	00PSI Por	e Pressure	•	0.09PSI	Soil Behavior Type	 ▼ 	ut of range>	
	FORCE:	0 lbf	0 N	FORCE:	0 lbf	0 N							
0	0	PSI	0)	PSI	0 0		PSI	(0	ZONE		12
Depth (m)													
(,													
0													
U	0	PSI	0 0)	PSI	0 0		PSI	(0	ZONE		12
	ETWEEN READINGS		COMM STATU	S TAKE BASEL	INE	STAF	RT		STOP		NUMBER OF C	RAPHS 4	•
		Tip Sleeve Temperature	-1.27PS 0.00PS 155.45C	Pore Pressure Exc Sense Inclination X	0.09PS 0.98V -0.02Deg	Inclination Friction Rat SPT-	io	0.00%	Soil Behavior	OZONE			
C		PTH	0.0) m					MANUAL CLAMP		SEISMIC	CAMERA CAMERA C LAMP ON UV ON I IR ON	NC
TOTAL INCL:	00.0 deg							\sim	AUTO CLAMP. INA	DI ANT DIS	OF STICK	IR ON	

Figure 41 Sounding Screen (shown in outdoor display mode)

Up to 4 graphs can be selected to display during the test (there is a drop down box on the right side of the screen to change the number of graphs)

The inclinometer 'bubble' is displayed in the lower left corner. It is green up to 7 degrees, then turns yellow for warning through 12 degrees and then will turn red. This visual change is for operator awareness. See Module Settings instructions for using inclination to generate a stop condition.

Across the bottom is one window for recorded depth and one for push speed. The push speed box will be green when pushed at ASTM rate of 2cm/sec and yellow when close to that.

The clamp light will show green when clamp is detected engaged or when the MANUAL CLAMP button is used. The MANUAL CLAMP button allows for system use with virtually no interface with the push

system and allows the operator to control when data is collected. The AUTO CLAMP button will engage data collection whenever the conditions for the clamp circuit are met and valid depth is being collected.

Perform Seismic / Start Dissipation / and CAMERA selections will be covered later in this manual

Just above the Depth and Speed boxes is a series of white boxes across the screen that display all the readings that are checked in the detected module set up screen so they can be monitored even if they are not being graphed.

Just above this (and below the actual graph sections) are the buttons for TAKE BASELINE -- START -- STOP. Notice that they are grayed out unless that action can be performed.

We have also included a TIME BETWEEN READINGS which updates continuously based on cone communications. This is on screen indication that the cone is functioning and in communication with the DataPack. The time displayed will vary depending on how many channels are being used and amount of data. The green indicator beside the time box is a visual indication of COMM STATUS.

Each Graph section can be assigned to any of the channels available in the drop down menu. Choice based on module or cone attached and detected.



Figure 42 Test screen with a drop down open (shown in indoor display mode)

Now is the time to verify and set up the system as detected. At the top of the screen go to SYSTEM SETUP and click on it. The upper left section should be verified for each module connected. The upper right section and lower section are for the test in general (not affected by module settings)

SETUP	_	-	_	_			_	_	
SETUP MODULI			· ·	DETECT ON S	STARTUP No	•	DEPTH U	NITS 📀 meter	s 🔿 feet
	3 - DA1	P/RES TAPACK	^ : N/#			RECORD	DEPTH TRANSDUCE	R SN N/A	
CHANNEL NAME N/A	5 · SEI 6 · FFD			C YES © N	<u> </u>		DEPTH COUNTER	TYPE C ENC © POT	ODER ENTIOMETER
N/A	8 - CAN	UNTER MERA		C YES @ N			ENCODER DIREC	lob	•
N/A	- 3 - MO	T Steeve		C YES @ N	0 🗖		ENCODER RESOLU	TION 5	mm/step
N/A [C YES @ N		_	POTENTIOMETER OU	PUT	
I.		T					SET DEPTH	0 m) 0.	17716
N/A		v	0 -	C YES 🖲 N			SET DEPTH	1 m) 3.	13820
N/A		Ŧ	0 🔻	C YES © N			CLAMP CONFIGUR/	TION Normally	Open 🔹
N/A		Ŧ	0 🗸	O YES @ N			SOUNDING RECORDING N		E BASED TH BASED
N/A		Ŧ	0 -	C YES @ N			DEPTH INCREM		mm
N/A		Ŧ	0 -	C YES @ N	0		TIME INCREM	IENT Continuo	▼ su
N/A		Ŧ	0 -	C YES @ N	0 🗆		DEPTH FOR	MAT Normal	•
N/A		-		O YES @ NI	0		MODULE SERIAL P	21 -	
N/A				O YES @ NI			GPS SERIAL P		AUTO DETECT MODULE AND ENCODER PORT
		T					ASCII-OUT SERIAL P ENCODER SERIAL P		AND ENCODER FORT
N/A		T	0 -	O YES @ NI	D		ENCODER SERIAL P	URT 11 -	
COMPAN	IY NAME	ARA			QUITS ACTIVATED) Yes	▼ *.DA	T FILE FORMAT	Coneplot and ProDAT
TIP PLOT			•	l.	L BEHAVIOR CHART				Auto-Increment
PP GRAPH			•		SCREEN HEADER			ORDING MODI	
AUTO-ENHANCE			• -		SCREEN HEADER :	-		E DISSIPATION	
AUTO-FILTER SHOW GR			<u>•</u>	VIDEU	OVERLAY (+DEPTH	. ,	SAVE SCREE	N SIZE ON EXI	ſ No 💌
Show dh	ID LINE 3	1.62	•		SAVE	CANCEL			

Figure 43 Setup screen with module drop down open/ string pot selected

5.2 Setting the Depth Potentiometer (String Pot)

Now we verify the settings that we discussed earlier and set up the string potentiometer if that is the depth device selection.

Stage the string of the potentiometer as if you were ready to start a rod push. This is the zero (0m) meter position. Press the SET DEPTH (0m) button. This will record the starting point of the push. Then advance the string *exactly* one meter (as if you pushed a rod) and push the SET DEPTH (1m) button. This will record that point. The system now has recorded the voltage change for one meter of movement and will accurately provide depth and speed data with calculations based on this set up. (Our standard 80" string pot will provide approximately one volt differential in the one meter stroke)

NOTE: The distance the string is moved during this set up needs to be <u>exactly one meter</u> whether you are displaying feet or meters.

NOTE: Some users mount the string pot high and pull the string for a rod insertion, while others mount the string pot low so that the string is retracting on insertion. So some will have the higher reading on the (0m) line and others will have the higher reading on the (1m) line. Either is okay - depth is only increased while the string is moving in the appropriate direction.

The optional optical encoder can only be selected in the SYSTEM SETUP/TROUBLESHOOT screen (ref figure 21 & 22). This cannot be changed after detecting the VTK DAS.

5.3 Setting up the test screens

Verify the settings for each module that is used (figure 39) You can change units of measure, decimal places to display and whether or not to display any of the items that are not grayed out.

Now is also the time to verify the two screen headers desired and whether or not you want to auto enhance and/or filter the seismic waves if you are doing seismic tests.

Save these settings and then click on the Module Settings button:

SET MODULE DELAYS	MARK IN	-	
	SEISMIC CON	E : 4444.138XX	
м	CHANNEL OFFSET: EASURED FROM START OF MODULE		PACITY: ENTER T APPLICABLE
Тір	3.8354 centimeters	0	PSI
Sleeve	16.4846 centimeters	0	PSI
Side Temp	0 centimeters	0	С
Pore Pressure	0 centimeters	0	PSI
Excitation Sense	0 centimeters	0	V
Inclination X	2.54 centimeters	0	Deg
Inclination Y	0 centimeters	0	Deg
N/A	N/A centimeters	0	V
N/A	N/A centimeters	0	V
N/A	N/A centimeters	0	
c	VERALL MODULE LENGTH	43 centimeters	
SEISMIC MODULE DETER	CTED. INTERVAL SEISMIC?	• NO C YES	
INTER	VAL SEISMIC SEPARATION	0 centimeters	
		ж	

Figure 44 Set Module Delays

A length is required in OVERALL MODULE LENGTH so the system can keep track of the offsets if another module is added to the CONE. Exact length of the cone is not critical unless another module is to be added The data entries for the tip offset, pore pressure, sleeve offset and inclinometers are grayed out as this information is stored in the cone.

NOTE: True Interval Seismic cones are very rare. Select no for this setting unless you confirm with the factory. (A true interval seismic cone has either one meter or one half meter separation between geophones making the cone considerably longer than standard)

Channel Capacity Settings

On the right hand side of the Module Settings screen (Fig 40) you can enter capacities to trigger a system quit alarm. If you leave them at zero then the system will not go into quit state unless the rate of change is excessive. See fig 41 for a sample alarm based on inclination exceeding the 12 degree setting in module settings.



Figure 45 Overload sample screen

Click okay to return to the testing screen. Now click on TEST SETUP :

	Т	EST INFO	RMATION			
TEST ID	12		CLIENT	one		
OPERATOR / CREW			CLIENT REPRESENTATIVE			_
PROJECT	45		WEATHER	RAIN		-
SITE			SOFTWARE VERSION	2.7.0		
LOCATION			DAS SYSTEM			-
START DEPTH (ft)	-		PROBE SERIAL #			_
	Fri 12/Oct/2018		SAMPLE RATE	N/A		_
	15:18:02		DEPTH INCREMENT (m)	20m		
COMMENTS			TIP CONFIGURATION	Conical (default)		-
GPS (LAT, LON, ELEV, NSAT, QUAL)			BALL TIP DIAMETER		millimeters	_
WATER TABLE DEPTH (m)	0		NET AREA RATIO (FOR Qt)	.8		
PREV GPS: 0, 0, 0, 0, 0	ACQUIRE GPS (AUTO)		DISSIPATION MODE	INTERVAL		-
DRIVE	ENTER GPS (MANUAL)		EXISTING DAT FILES	,		
🗇 c:		-	234(001).DAT			-
DIRECTORY			234(001)_PD.DAT 234(002).DAT			E
<u>a</u> c:\			234(002)_PD.DAT			
Copt test			234(003).DAT 234(003)_PD.DAT			
Cpt1tst			234(004).DAT			
			234(004)_PD.DAT 234(005).DAT			
			234(005)_PD.DAT			
			234(007).DAT			
			234(007)_PD.DAT 234(008).DAT			
			234(008)_PD.DAT			•
CREATE NEW I	DIRECTORY	FILENAI	ME FFD(042)			
:\cpt test\FFD(042)	o	к	CANCEL			

Figure 42 Setup Test Screen

This is where you enter pertinent information to be saved as header information in the cone data file. Notice that there are several grayed out sections that are auto filled by the system. The data in the upper half is self-explanatory for the most part. Start depth (elevation) would only be entered if DEPTH FORMAT Elevation was selected in setup. (using elevation mode and not entering a start depth will result in negative depths on test results) GPS data can be input automatically with an external GPS unit connected to your computer or manually using standard convention format.

On this screen as well you can select which drive and folder you want to store the test results in. At the bottom is a button for CREATE NEW DIRECTORY to enable better organization of data. NOTE: Many computer operating systems do not allow users to write data files directly to the root directory.

NOTE: the filename will be the name the test is stored under in your computer, the test ID is only for your reference. On some computers file names with spaces or special characters can cause issues. Please use standard naming practices.

Click okay to return to the test screen.



Figure 43 Sounding Screen

5.4 SOUNDING

Now the test screen is populated with the settings chosen and headers entered and identified in previous steps.

Ensure that the cone is in position (vertical) and ready to push but not in contact with the ground. This is when a baseline is taken. (Prior to taking the baseline it is important for the cone to be at or near the anticipated ground temperature. Either sitting in the hot sun or being stored in a freezing cold truck overnight can lead to significant baseline shifts as the cone comes to ground temperatures—take steps to keep the cone at an even temperature to ensure best results)

Take the baseline by clicking the TAKE BASELINE button, then stage the cone on the ground and press START. Data will now be displayed and recorded when the depth is moving and the 'clamp' is green.

If the system being used to push the cone has a clamp switch or other means of indicating status of the push then the AUTO CLAMP button would be used to allow the data collection to occur as the rods are pushed. If there is no interface then the TOGGLE CLAMP button is used to tell the system when to accept data (both depth and cone data) The CLAMP indicator is green when data can be collected and is blank when data is not collected (while adding rods)

NOTE: Seismic tests should be conducted with the clamp disengaged from the rods to reduce the possibility of data distortion via pressure on the rods.

During the push the DEPTH indicator will be green when going in the proper direction (into the ground) red when going up and blank when not in motion. (With the potentiometer used this display will be steady; with the encoder in use the indicators will 'flash' using the same color pattern)

Continue the test in this manner until the desired depth is reached or refusal is reached. Refusal can be for excessive forces recorded by the probes or for reaching the limits of the push system due to total resistance exceeding reaction weight or hydraulic push capacity.

It is recommended to record an ending baseline reading at the end of the push. To do this, do not end the test until the rods and cone are fully out of the ground and in the same position as the pre push baseline. Ensure the sleeve is not packed with dirt to inhibit freedom of movement and take the baseline.

Then end and save. You can choose to start another test or completely close.



Figure 44 Sounding screen with push in progress
E VERTEK CPT, 2013									_ 0 <u>×</u>
Test Setup System Setup	Module Settings	Module Placement	Mo <u>n</u> itor <u>C</u> la	ssification E <u>x</u> it					
SOUNDING	Module Settings	Moduler Meemene							
		-			TID: 4456, OPERATOR				
Tip	-		Sleeve	<u> </u>	0.01TSF Pore Press	ure 🔻	0.00TSF	Friction Ratio	2.00%
FORCE:		53 N	FORCE:	4 lbf	16 N				
0	TSF	2 ()	TSF	1 0	TSF	1	0 %	4
Depth (m)		<u>o</u> .							
TIME BETWEEN REAL CURRENT SOIL BEHA	,		TAKE BAS	SELINE	START		STOP	NUMBER OF GF	RAPHS 4
	Aux1 Rod Depth A Clamp DEPTH	0V 1.15m 0.00N 1.1	Tip		Excitation Sense Inclination X Inclination Y	1.00V 2.26Deg -2.95Deg DEPTH CLAMP	MANUAL CLAMP (O	FF) PERFORM SEISMIC	

Figure 49 Sounding in progress at a pause (not clamped)

SECTION VI SEISMIC TEST

If the system has been set up to perform seismic tests and a seismic cone is attached, then seismic tests can be performed during the sounding. This section describes the seismic test.

This section assumes that CPT sounding is in progress and advanced to the desired depth for a seismic test.

This section also assumes that a suitable strike plate (or automated device) is properly situated near the CPT push system (normally 5 to 10 feet from the CPT entry point into the ground), and that the trigger to register the strike is properly mounted and functioning.

The strike plate(s) must be positioned so that they are secure and will impart the maximum amount of shear wave force to the seismic sensor. The best place to put the strike plates is underneath the leveling jacks of the push system that are closest to the hole. When the leveling jacks are advanced downward, they will secure the strike plates in position. The strike plates can be made of wood blocks with L shaped metal brackets bolted to them, or they can be made of square metal tubing. Whatever is used, it must be capable withstanding the maximum amount of pulling force expected and large enough so that the leveling jack does not slip during the push. If the strike plate fails, the rods can be bent or the cable can be cut. NOTE: If a Vertek 20-ton truck is used, the one piece front leveling jack as strike plates. This may damage the jacks.

The following screen is displayed when the PERFORM SEISMIC button is clicked on the main test screen:

VERTEK CPT, 2014		
Test Setup System Setup Module Settings Mod	lule Placement Mo <u>n</u> itor <u>C</u> lassification <u>C</u> ommunication Delay Ram Settings Verification <u>Ex</u> it	
SEISMIC (INTERVAL SEISMIC:	OFF) TEST ID: 12345, OPERATOR: 23	STRIKE OPTIONS
1 SGEO1-	N/A	INTERVAL (mS)
SGE02 PGE0		500 mS (MODE 1) 💽
PGEO	2.07	SELECT GEOPHONE
	Current Arrival Time (mS) N/A	SGEO1 ONLY
	N/A	G SGEO2 ONLY
		SGE01+SGE02
		C PGEO
		C ALL GEO
		SEISMIC GAIN
		50 • (SGE01+2)
0		50 • (PGEO)
		,
		SET DEFAULT STRIKE
		OPTIONS
		FIND ARRIVAL TIME
		MOVE ARRIVAL TIME
		LEFT
-1		MOVE ARRIVAL TIME RIGHT
0 IF SHOW PREVATEST IF SHOW PREV B TEST	F SHOW PREV P TEST TIME (mS) COFFSET AAND B TESTS (DISPLAY ONLY) 500	OMS SCALE / SHIFT GRAPH
PERFORM A(SGE01) + B(SGE02) STRIKE	RETAIN STRIKE DISCARD STRIKE REMOVE STRIKE SAVE TEST / RETURN TO SOUNDING	
Tip	0.00PSI Exc Sense 1.01V Friction Ratio 0.00%	
Sleeve	-1.77PSI Inclination X -0.81Deg SPT-N 0	
Pore Pressure	0.68PSI Inclination Y 0.29Deg Soil Behavior 0ZONE	
DEPTH		
		E LAMP ON
	CLAMP OLO CITI/S CLAMP O AUTO CLAMP: ACTIVE START DIS	SSIPATION DV ON
TOTAL INCL: 00.9 deg		IR ON

Figure 46 Seismic test screen

The main screen information is still displayed in the lower portion of this screen. The options for a seismic test are selected on the right side.

- INTERVAL (ms) is the length of time the system will wait for the arrival time after the trigger signal is received. This is selected via the drop down menu (100 ms to 1 minute)
 - 100ms to 1 second tests are 'Mode 1' tests and can be used to plot standard waterfall graphs and to generate a velocity profile. Tests between 10 sec and 1 minute are 'Mode 2' tests and do not have arrival time processing functions available. This is only used to record the seismic activity present in the ground (created by other equipment) This can be useful in site work not related to CPT. (all geophones can be recorded at the same time in this mode)
- Click on the geophone to be monitored (SGEO1 only, SGEO2 only, SGEO1 & SGEO2, or PGEO). This selection determines which geophone in the cone is to be monitored. The DataPack Seismic switch or remote trigger switch is used to select the proper up-hole trigger. (some seismic tests are done using 3 trigger locations the selector switch is only to select the proper trigger.
- SEISMIC GAIN is the amount of gain on the signal to be applied for graphing purposes. Selected via the drop down menu (1 to 5000 available)
- AUTO ENHANCE this will automatically enlarge (enhance) the signal to provide a more visible arrival wave
- FILTER this box checked will provide a cleaner visual arrival wave for easier evaluation.



Figure 51 Trigger remote switch/ DataPack switch / connector hub with trigger and switch

Click on the PERFORM STRIKE box. The selection on the right side will determine which geophone is recorded. For this sample SGEO1 & SGEO2 is selected. The Waiting For Seismic Trigger box will appear. (if an error appears at this point –UNABLE TO INITIALIZE 1608FS- refer to troubleshooting for steps to initialize)

VERTEK CPT, 2014				
		ommunication Delay Ram Settings Verification	Egit	
SEISMIC (INTERVAL SEISMIC:	OFF) TEST	ID: 12345, OPERATOR: 23		STRIKE OPTIONS
1 SGE01 SGE02 PGE0		Waiting For Seismic Trigger Cancel	N/A N/A Current Antival Time (mS) N/A N/A	SELECT GEOPHONE
-1 0 F SHOW PREVATEST F SHOW PREV B TEST	F SHOW PREV P TEST	TIME (mS)	ND B TESTS (DISPLAY ONLY)	MOVE ARRIVAL TIME RIGHT 500mS SCALE / SHIFT GRAPH
PERFORM A(SGE01) + B(SGE02) STRIKE	RETAIN STRIKE	DISCARD STRIKE REMOVE STRIKE	SAVE TEST / RETUR RETURN SOUN	
Tip Sleeve Pore Pressure DEP TH	0.00PSI Exc Sense 0.73PSI Inclination X 0.73PSI Inclination Y SPEER 6.80 ft	1.01V 0.93Deg 0.64Deg 0.00 cm/s		

Figure 52 Waiting for Trigger

Once the trigger signal is received the system will display the cone geophone response on the screen. It also displays the 'Select Seismic Wave' box shown in Fig 49 to choose the geophone that is better aligned to the strike to improve test accuracy. Note that in this example the interval was at 500 ms so the arrival

time was approximately 125 ms after trigger and that SGEO1 has the better response so it would be recommended to use SGEO1 and set as default for this test. If the arrival wave was not definite it is recommended at this time to orient the cone and try again until a good arrival wave is obtained.

VERTEK CPT, 2014	and the second	and store	_ • ×
Test Setup System Setup Module Settings Module Placement Monitor	Classification Communication Delay Ram Settings Verification	on Exit	
SEISMIC (INTERVAL SEISMIC: OFF)	TEST ID: 12345, OPERATOR: 23		STRIKE OPTIONS
1 SGE01 SGE02 PGE0		N/A N/A 2.07 Current Arrival Time (mS) N/A	500 mS (MODE 1)
		N/A	
	SELECT SEISMIC WAVE	1	¢ PGEO
	SHOWING PREVIEW WAVES: SELECT WHICH GEOPHONE TO USE FOR THE SEISMIC TEST		C ALL GEO
	□ SET AS DEFAULT		SEISMIC GAIN
0	USE SGE01 USE SGE02		50 Y (PGEO)
			F AUTO ENHANCE
<i>1</i>			SET DEFAULT STRIKE OPTIONS
			FIND ARRIVAL TIME
			MOVE ARRIVAL TIME LEFT
			MOVE ARRIVAL TIME RIGHT
-1 0 IF SHOW PREVATEST IF SHOW PREVI IF SHOW PREV B TEST	P TEST TIME (mS)	AAND B TESTS (DISPLAY ONLY)	500mS SCALE / SHIFT GRAPH
PERFORM A(SGE01) + B(SGE02) STRIKE	RETAIN A+B DISCARD A+B STRIKE STRIKE REMOVE STRIK	KE SAVE TEST / RETUR RETURN SOUN	
Tip -4.40PSI Sleeve -0.03PSI Temperature 22.34C	Pore Pressure -0.09PS Inclination Y Exc Sense 0.98V Friction Ratio Inclination X -0.02Deg SPT-N	-0.04Deg Soil Behavior 0ZONE 0.00%	
(() 5 10 15 DEPTH	SPEED SPEED	MANUAL CLAMP	CAMERA
	0 #		
	O ft	CLAMP AUTO CLAMP: STAT	RT DISSIPATION F UV ON
TOTAL INCL: 00.0 deg		ACIVE	🗖 IR ON

Figure 53 Initial strike

Now an A strike is performed, and then a B strike if desired. It is common to get an A & B (or left and right if you prefer that nomenclature) at each depth. Figure 50 shows the results of an A and a B strike after the SEO1 selection above.

VERTEK CPT, 2014	100	the second se		ALC: NO.	100			
	odule Settings Module Plac		Communication Delay R	m Settings Verification	Egit			
SEISMIC (INTERV	AL SEISMIC: OFI	r) _{TE}	ST ID: 12345, OPER	ATOR: 23				STRIKE OPTIONS
1 SG	E01						N/A	INTERVAL (mS)
SĞ	E01						N/A	500 mS (MODE 1)
PC	3E0						2.07	SELECT GEOPHONE
						Current Arrival Time (mS) N/A N/A	SGE01 ONLY
							DW/A	C SGE02 ONLY C SGE01+SGE02
								C PGE0
								C ALL GEO
								SEISMIC GAIN
								50 • (SGE01+2)
° Ann								
								AUTO ENHANCE FILTER
								SET DEFAULT STRIKE
								OPTIONS
								FIND ARRIVAL TIME
								MOVE ARRIVAL TIME LEFT
								MOVE ARRIVAL TIME
-1								RIGHT
0 F SHOW PRE F SHOW PRE		SHOW PREV P TEST	TIME (mS) □ OFFSETAAt	ND BIESIS (D	ISPLAY UNLY)	500mS	SCALE / SHIFT GRAPH
PERFORMA	PERFORM B		E DISCARD STRIKE	REMOVE STRIKE	1	SAVE TEST /	RETURN TO	FILTER / ENHANCE
STRIKE	STRIKE			INEMOVE OTHINE	ļ	RETURN	SOUNDING	
	Tip	-7.33PSI Pore Press		Inclination Y	-0.09Deg	Soil Behavior	0ZONE	
	Sleeve Temperature	-0.06PSI Exc Ser 22.88C Inclination		Friction Ratio SPT-N	0.00%			
(() 5 10 15	DEPTH		PEED	0.1.11			1	CAMERA
					DEPTH ()	MANUAL CLAMP: NACTIVE	PERFORM SE	ISMIC CAMERA ON
		6.80 ft			CLAMP	AUTO CLAMP: ACTIV	E START DISSIP	
TOTAL INCL: 00.1 deg						AUTO GLAMP: ACTN	E START DISSIP	F IR ON

Figure 54 with A & B strike

Then click SAVE TEST and return to sounding. A warning screen will appear if the seismic data is not saved before returning to sounding. At the next depth increment for seismic test the previous test will be shown.



Figure 55 Seismic test with two depths of A & B strikes

Please note that the samples shown on these pages are from a bench test and the appearance of the waves may vary.

Arrival times can be set before saving the seismic data and the option to do so is provided in the software. Experience has proven that; SETTING ARRIVAL TIMES at this time can lead to erroneous plotting. Many users find it better to gather all the seismic data for one sounding and choose arrival times during processing when the strikes from all depths can be viewed on one screen.

SECTION VII DISSIPATION TEST

To run a dissipation test, stop the push motion, unclamp, and click on the START DISSIPATION box.

The dissipation screen will appear (fig 60) and the green line will increment across the page in one second increments, while recording the pore pressure. When the pressure has equalized or reached a predetermined level, click on SAVE DISSIPATION if the data is valid, or RETURN TO SOUNDING. Returning to sounding without saving the data will bring up an error (see fig 61) Select the proper option to proceed as desired.

In the Dissipation Interval Mode, the recorded intervals change during longer tests as follows: 1 second for the first minute, 5 seconds for the next 9 minutes, 30 seconds for the next 50 minutes, and 5 minutes thereafter.

In the Dissipation Continuous Mode, data is recorded at each communication cycle of the data pack to cone/ normally 2 or 3 times per second. This is not recommended for long dissipation tests due to the file size that can be created.

In between the above options is One Second Interval selection which records as indicated; once per second.



Figure 60 Dissipation Screen with a Short Dissipation test



Figure 61 Dissipation unsaved warning

NOTE: It is recommended to not run another dissipation test until the cone has been advanced a few inches.

VIII VERIFICATION

Regular VERIFICATION of equipment is required by some agencies and or customers. To allow this Vertek has a simple verification process built into the VTK series software.

To run a verification test on the cones requires a load cell and pressure chamber that can be plugged into the DataPack AUX connector. Select the Verification tab at the top of the sounding screen and then select sensor setup at the top of the PROBE VERIFICATION screen. This is prompted the first time it is opened. Enter the data from the device tags or calibration sheets and save the data.

PROBE VERIFICATION			
Save Sensor Setup Cano	el		
SLEEVE TRANSDUCER	STATUS: IDLE		
APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	Applied N	leasured Dev %
Í	REFERENCE SENSOR SETUP	ſ	
START SLEEVE VERI	REFERENCE LOAD CELL (for Tip and Sleeve	<u>Verification)</u> 	
RESET SLEEVE VERI	MANUFACTURER		
	SERIAL NUMBER		
TIP TRANSDUCER	CAPACITY (lbf) 0	(e.g. 10000)	ured Dev %
	SENSITIVITY (mV/V)	(e.g. 4.368)	
START TIP VERIFIC STOP TIP VERIFIC RESET TIP VERIFIC PRESSURE TRANSDUCER APPLIED PRESSURE (PSI)	REFERENCE PRESSURE TRANSDUCER (for P MANUFACTURER SERIAL NUMBER CAPACITY (PSI) SENSITIVITY (mV/V) SAVE	P Verification (e.g. 500) (e.g.100)	
START PRESSURE VER	IFICATION		
STOP PRESSURE VER	FICATION		
RESET PRESSURE VER	FICATION RECORD PP READING	ſ	

Figure 62

REFERENCE SENSOR SETUP		
REFERENCE LOAD CELL (for	r Tip and Sleeve V	erification)
MANUFACTURER	SENSOTEC	
SERIAL NUMBER	abc	
CAPACITY (Ibf)	10000	(e.g. 10000)
SENSITIVITY (mVAV)	4.368	(e.g. 4.368)
REFERENCE PRESSURE TRA	NSDUCER (for PP	Verification)
MANUFACTURER	Honeywell	
SERIAL NUMBER	def	
CAPACITY (PSI)	500	(e.g. 500)
SENSITIVITY (mV/V)	100	(e.g.100)
SAVE	CANCEL	

Figure 63

ve Sensor Setup Cancel			
	STATUS: VERIFYING SL	EEVE	
SLEEVE TRANSDUCER APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	Applied	Measured Dev %
0.00	0.00		
		•	
START SLEEVE VERIFICATION			
STOP SLEEVE VERIFICATION			
RESET SLEEVE VERIFICATION	RECORD SLEEVE READING		
IP TRANSDUCER			
APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	Applied	Measured Dev %
N/A	0.00		
START TIP VERIFICATION			
START TIP VERIFICATION			
	RECORD TIP READING		
STOP TIP VERIFICATION RESET TIP VERIFICATION	RECORD TIP READING		
STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	Applied	Measured Dev %
STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	-	Measured Dev %
STOP TIP VERIFICATION RESET TIP VERIFICATION	MEASURED PRESSURE (PSI)	-	Measured Dev %
STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	-	Measured Dev %
STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER PPLED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	-	Measured Dev %
STOP TIP VERIFICATION RESET TIP VERIFICATION PRESSURE TRANSDUCER APPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	-	Measured Dev %

Figure 64

e Sensor Setup Cancel			
	STATUS: VERIFYING TIP	>	
LEEVE TRANSDUCER PPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	Applied	Measured Dev %
		1.07	0.89 -17.55
N//	٥.00	4.53 11.01	4.35 -4.13
		17.49	17.28 -1.19
	1	28.56	28.34 -0.76
START SLEEVE VERIFICATION	1		
STOP SLEEVE VERIFICATION			
RESET SLEEVE VERIFICATION	RECORD SLEEVE READING		
P TRANSDUCER			
PPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	Applied	<u>Measured</u> <u>Dev %</u>
2.7	6 3.88	47.73 137.66	49.19 3.06 141.09 2.49
	0.00	161.30	165.68 2.71
	0.00	161.30 177.49	165.68 2.71 181.22 2.10
		161.30	165.68 2.71
START TIP VERIFICATION		161.30 177.49	165.68 2.71 181.22 2.10
		161.30 177.49	165.68 2.71 181.22 2.10
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION		161.30 177.49	165.68 2.71 181.22 2.10
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER		161.30 177.49	165.68 2.71 181.22 2.10 209.69 2.29
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER PPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	161.30 177.49 204.99	165.68 2.71 181.22 2.10 209.69 2.29
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER	MEASURED PRESSURE (PSI)	161.30 177.49 204.99	165.68 2.71 181.22 2.10 209.69 2.29
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER PPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	161.30 177.49 204.99	165.68 2.71 181.22 2.10 209.69 2.29
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER PPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	161.30 177.49 204.99	165.68 2.71 181.22 2.10 209.69 2.29
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER PPLIED PRESSURE (PSI) START PRESSURE VERIFICATION	MEASURED PRESSURE (PSI)	161.30 177.49 204.99	165.68 2.71 181.22 2.10
START TIP VERIFICATION STOP TIP VERIFICATION RESET TIP VERIFICATION RESSURE TRANSDUCER PPLIED PRESSURE (PSI)	MEASURED PRESSURE (PSI)	161.30 177.49 204.99	165.68 2.71 181.22 2.10 209.69 2.29

Figure 65

IX. Troubleshooting

QUITS Not Activating -

- 1/ ensure that system set up is set to QUITS ACTIVATED YES
- 2/ ensure that a channel capacity is entered in the module delay screen
- 3/ ensure that a value or percentage is chosen for all desired channels in SET QUITS screen

UNABLE TO INITIALIZE 1608FS (SEISMIC)

Wa	iting For Seismic Trigger	•
_	Cancel	
CP	TSND	
l	JNABLE TO INITIALIZE	1608FS (SEISMIC)
		ОК

Click okay and then click okay again on below tab

	Waiting For Seismic Trigger	
CPTSND	Canad	×)
	D RUN INSTACAL. CPTSND WILL CL RESS CANCEL TO RETURN TO CPT	
		OK Cancel
VDTEST		

If this does not start the INSTACAL program then return to the start menu and find MEASUREMENT COMPUTING in the program list. Run the Instacal program, click on the add board icon and the USB 1608 should be found, click ok.

InstaCal File Install Calibrate	Test Help
PC Board List	Plug and Play Board Detection
	The following plug and play devices have been detected
	✓ USB-1608FS (serial# 36)
	Check those devices you wish to have added to the centiguration file.
Ready	

Instacal should then display the found item as board # 0. Close out of instacal and restart CPTSND.



CPT SND will provide the option to resume the test, follow the prompts and enter back into seismic test and proceed.