VTK Series CPTSND Software Manual

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

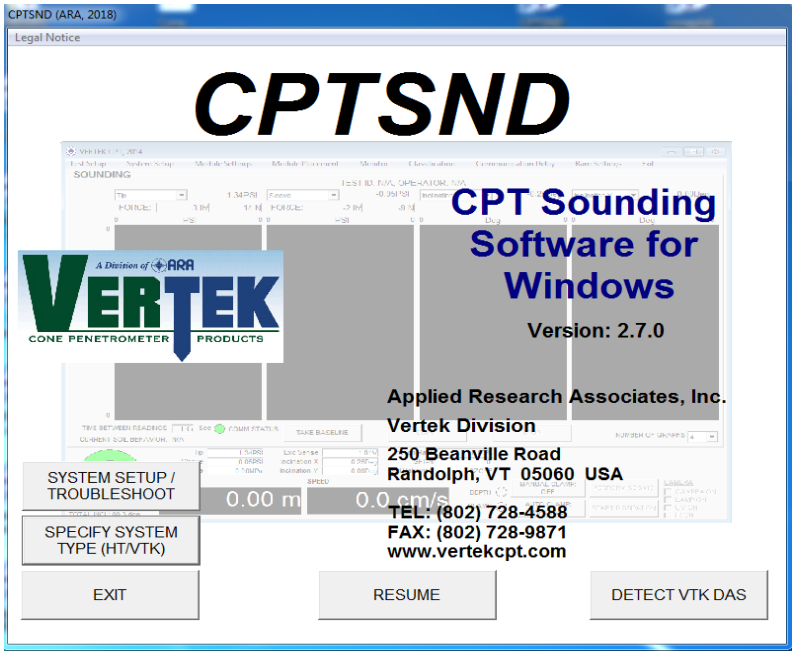


Table of Figures

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

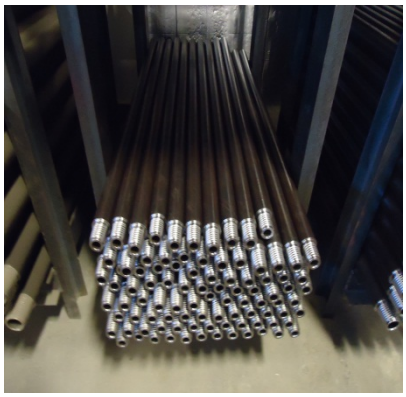


Figure 1 Speed Lock One Meter Rods

Figure 2 CBL-0030-50M Cable Assembly

Figure 3 4444 Cone Assembly Or Other

Figure 4 2537 Depth Transducer

Figure 5 1074 depth cable assembly

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”.

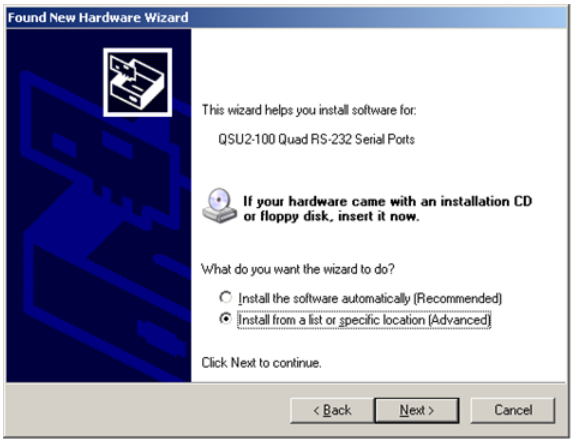


Figure 9 Software Install Choice

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.

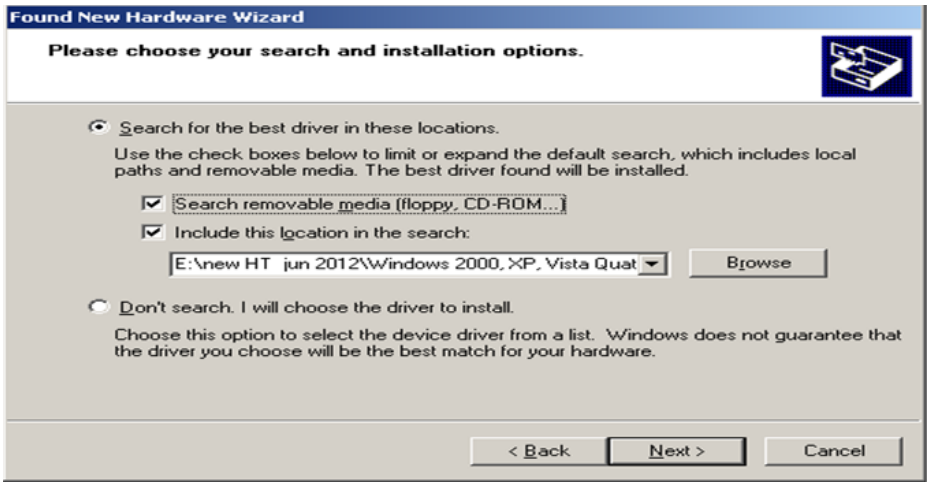


Figure 10 Search Installation Options

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:

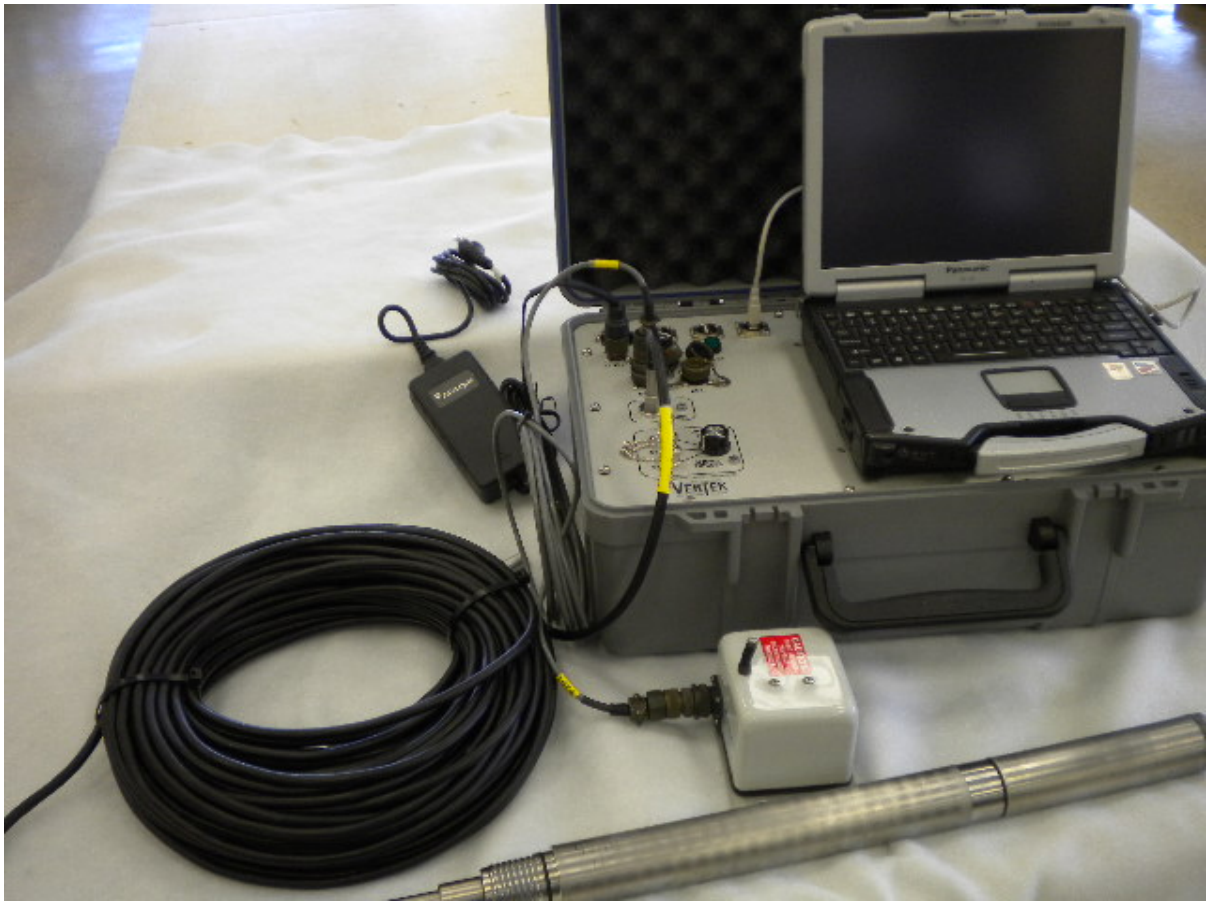


Figure 12 Picture of DATAPACK 2010SV with depth, cables and cone

4.1.1 Standard connections for DATAPACK 2010SV

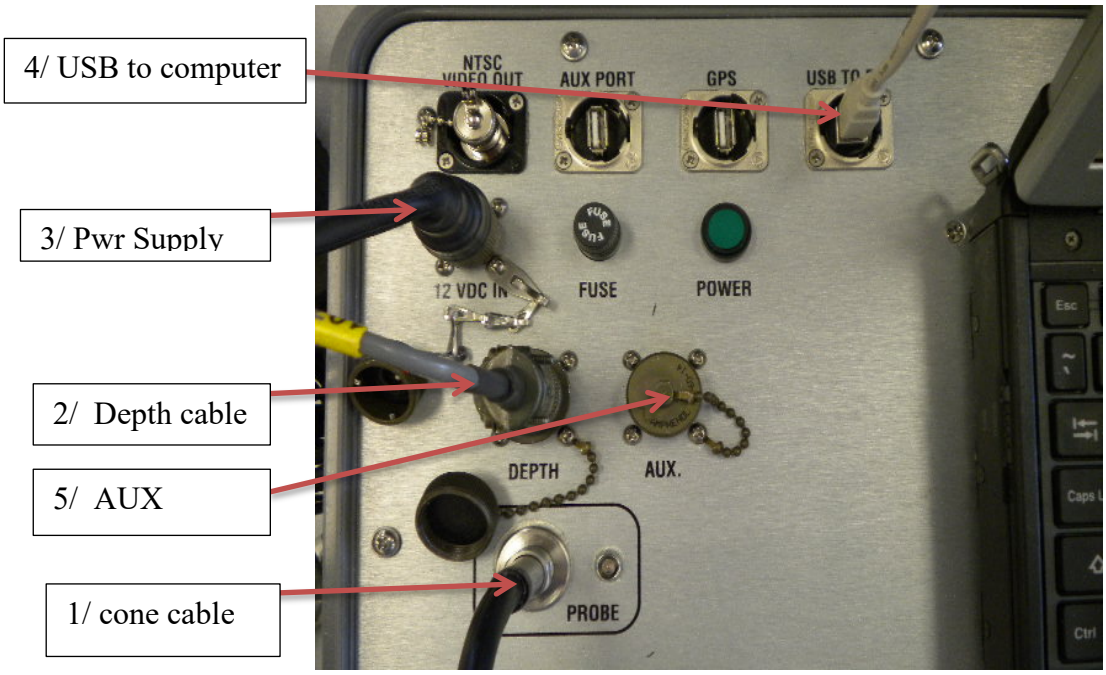


Figure 13 VTK Datapack 2010SV Connections

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):

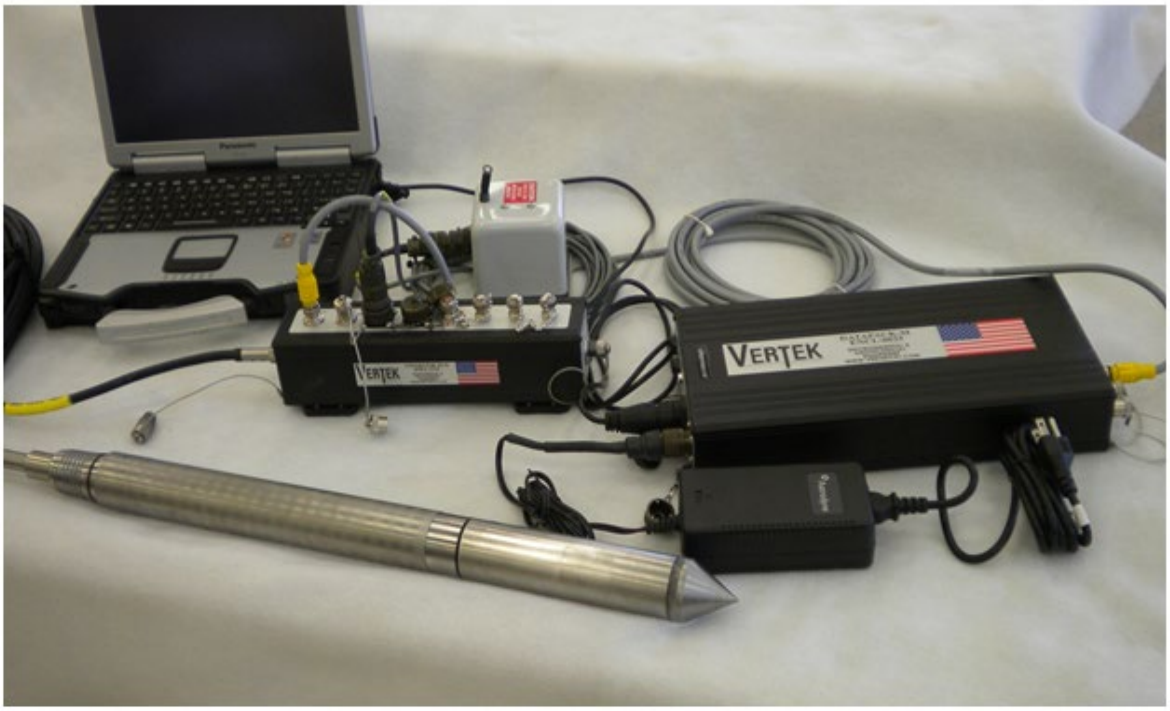


Figure 14 Basic VTK Modular System

Figure 15 Front Connections ENCL-0025

Figure 16 Rear Connections ENCL-0025

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

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):

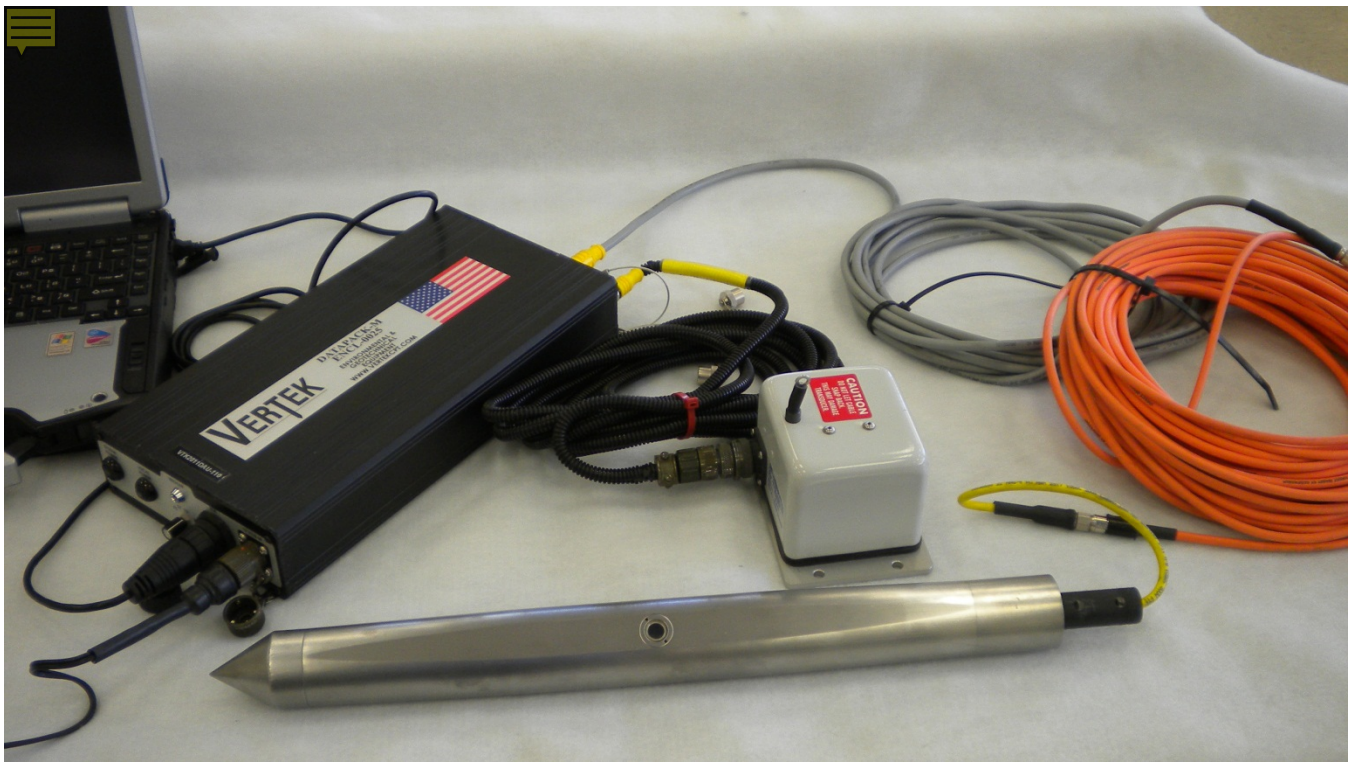


Figure 19 ENCL-0025 Modular DataPack used without Connector Hub

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

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 ??

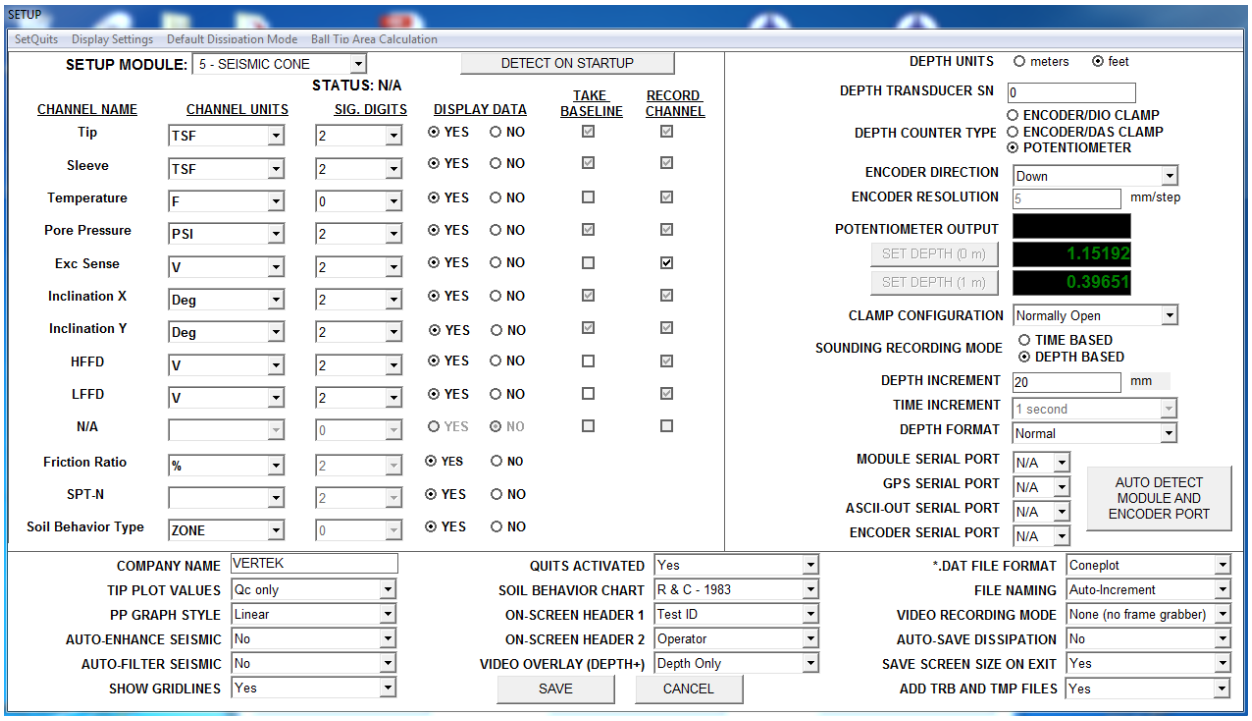


Figure 22 System Setup Screen

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.

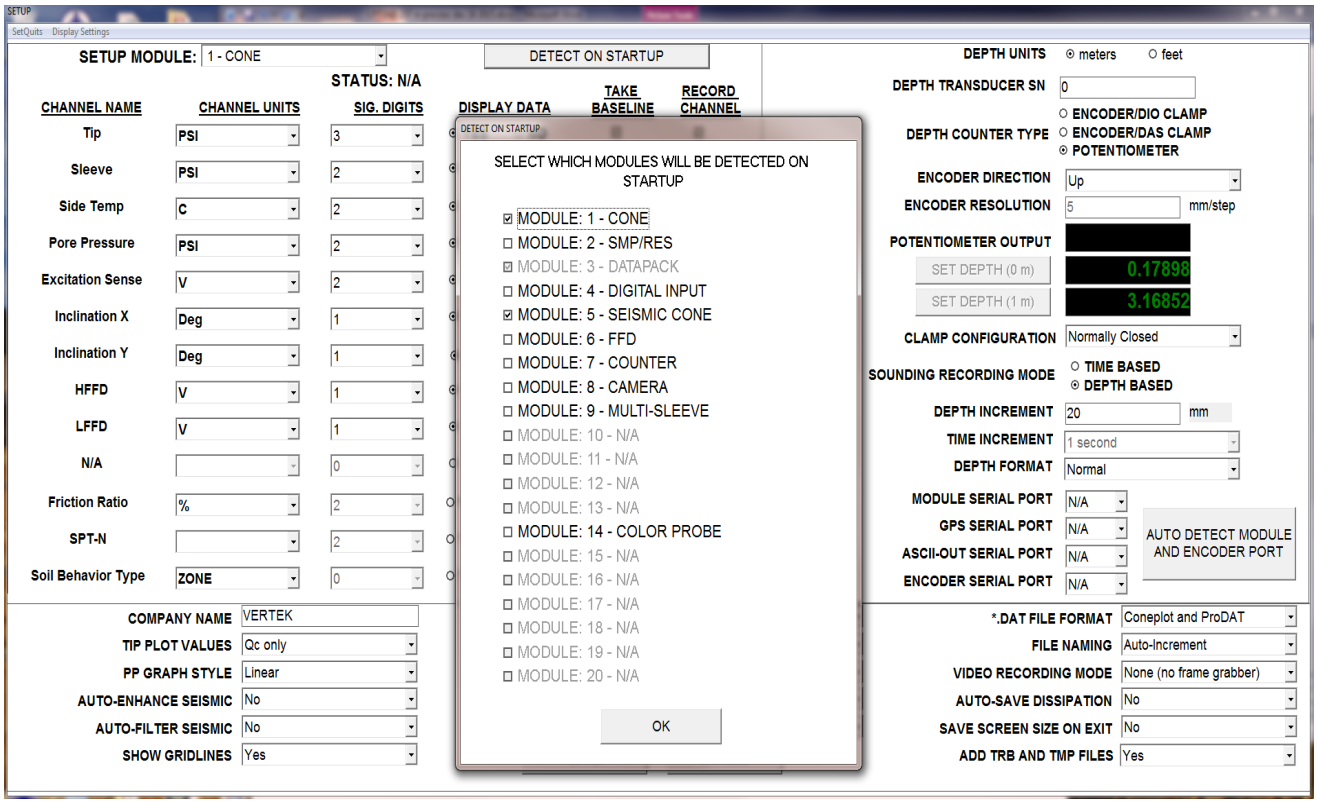


Figure 23 Detect On Startup

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.

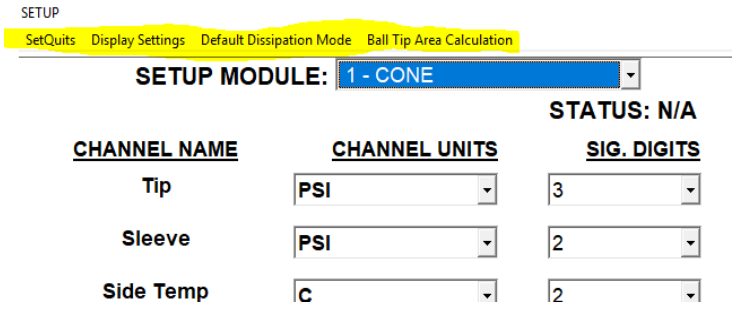


Figure 24

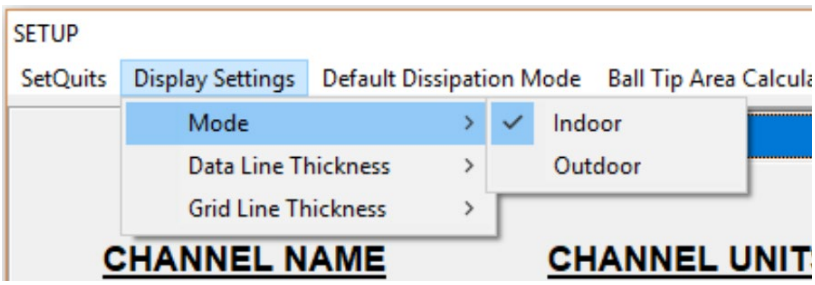


Figure 25 Display Settings

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).

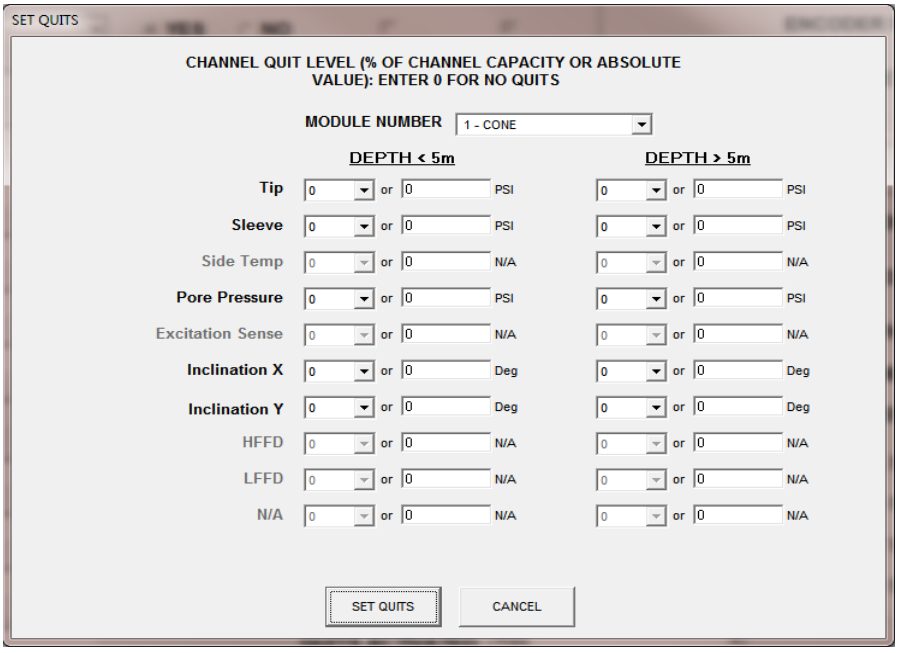


Figure 26 Quit Settings

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.

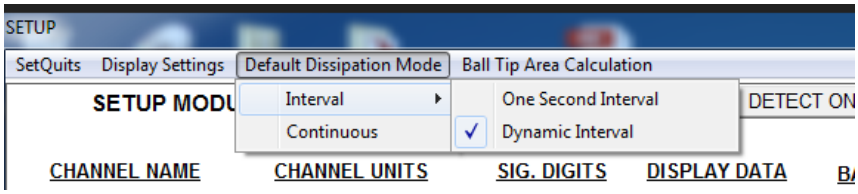


Figure 27 Dissipation Mode Selection

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

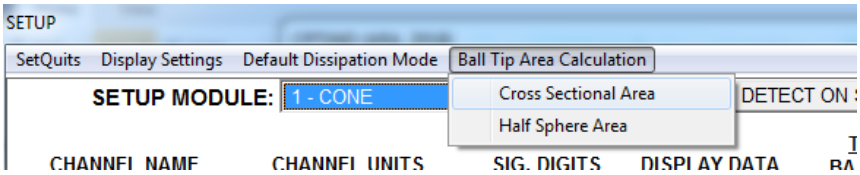


Figure 28 Ball Tip Area Selection

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.

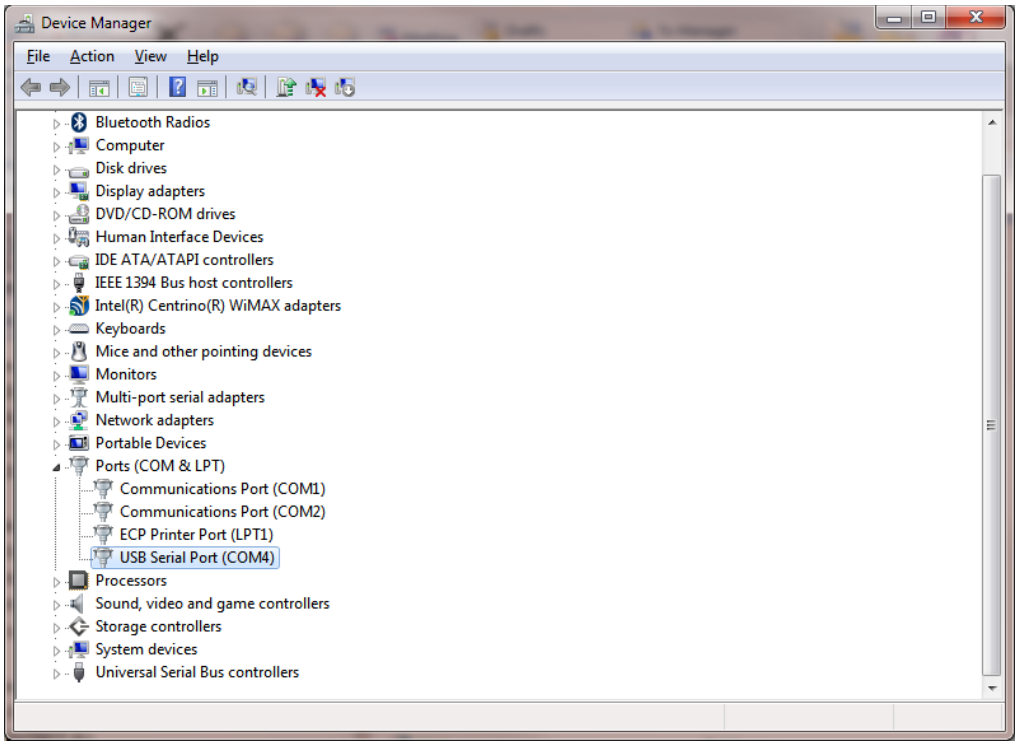


Figure 29 Device Manager Screen

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

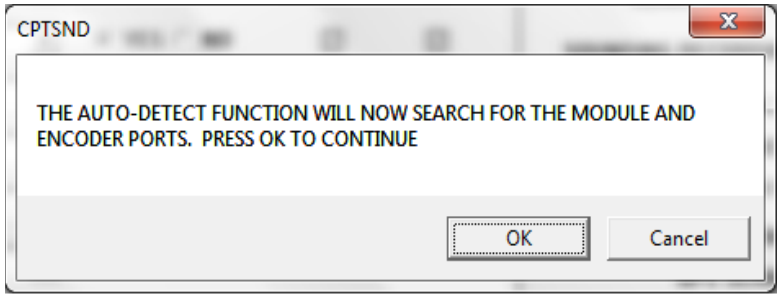
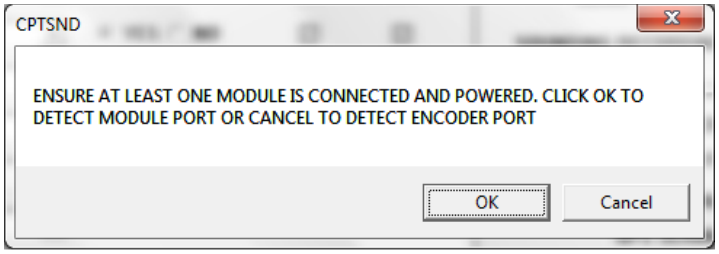


Figure 30 Auto-Detect notice

Figure 31 Detect Encoder notice



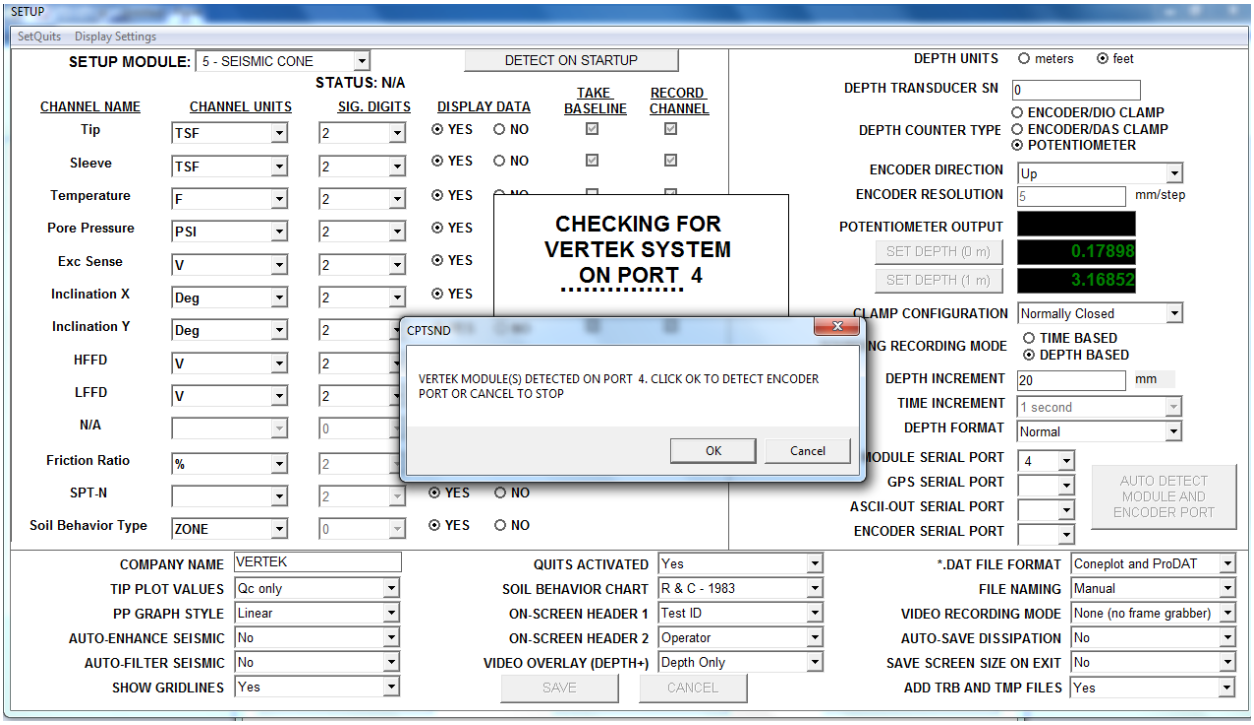


Figure 32 Checking for system notice

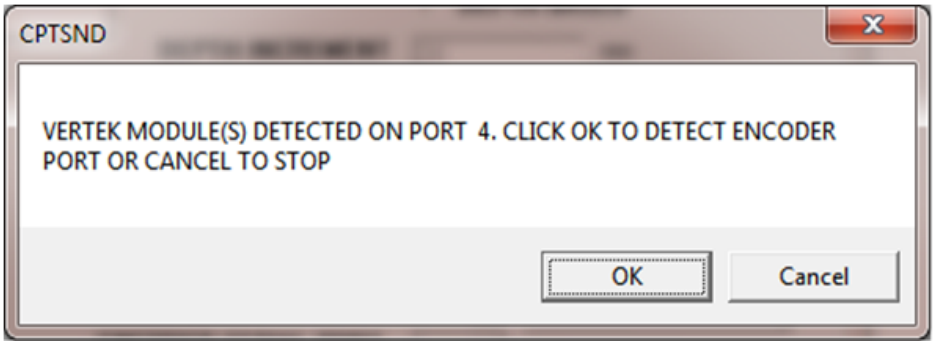


Figure 33 Modules Detected

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

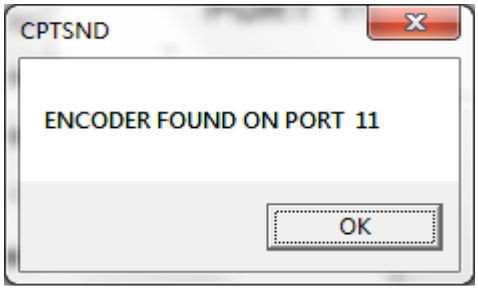


Figure 34 Encoder Found - With Potentiometer selected this will say Could not detect Encoder.

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.

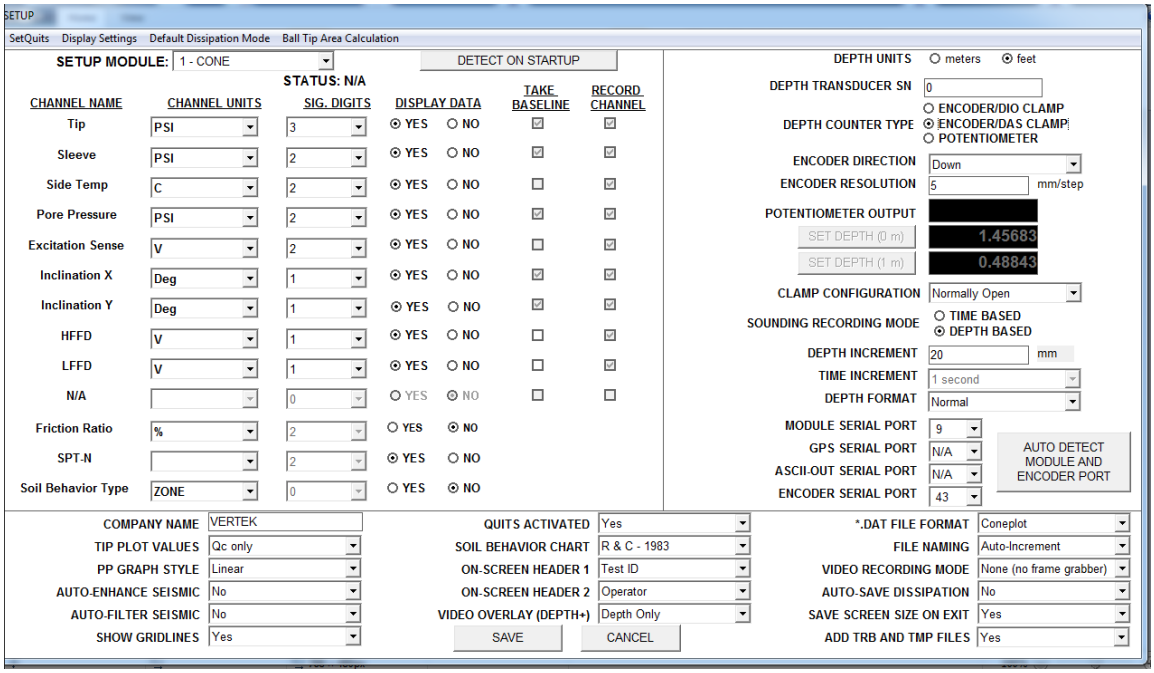


Figure 35 Set up screen with encoder selected

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.

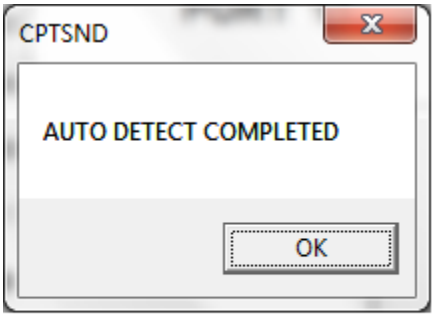


Figure 36 Auto Detect Completed

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.

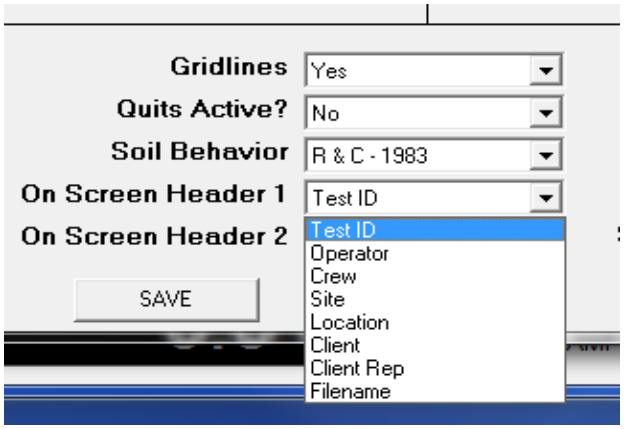


Figure 37 On Screen Header Drop Down Choices

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.

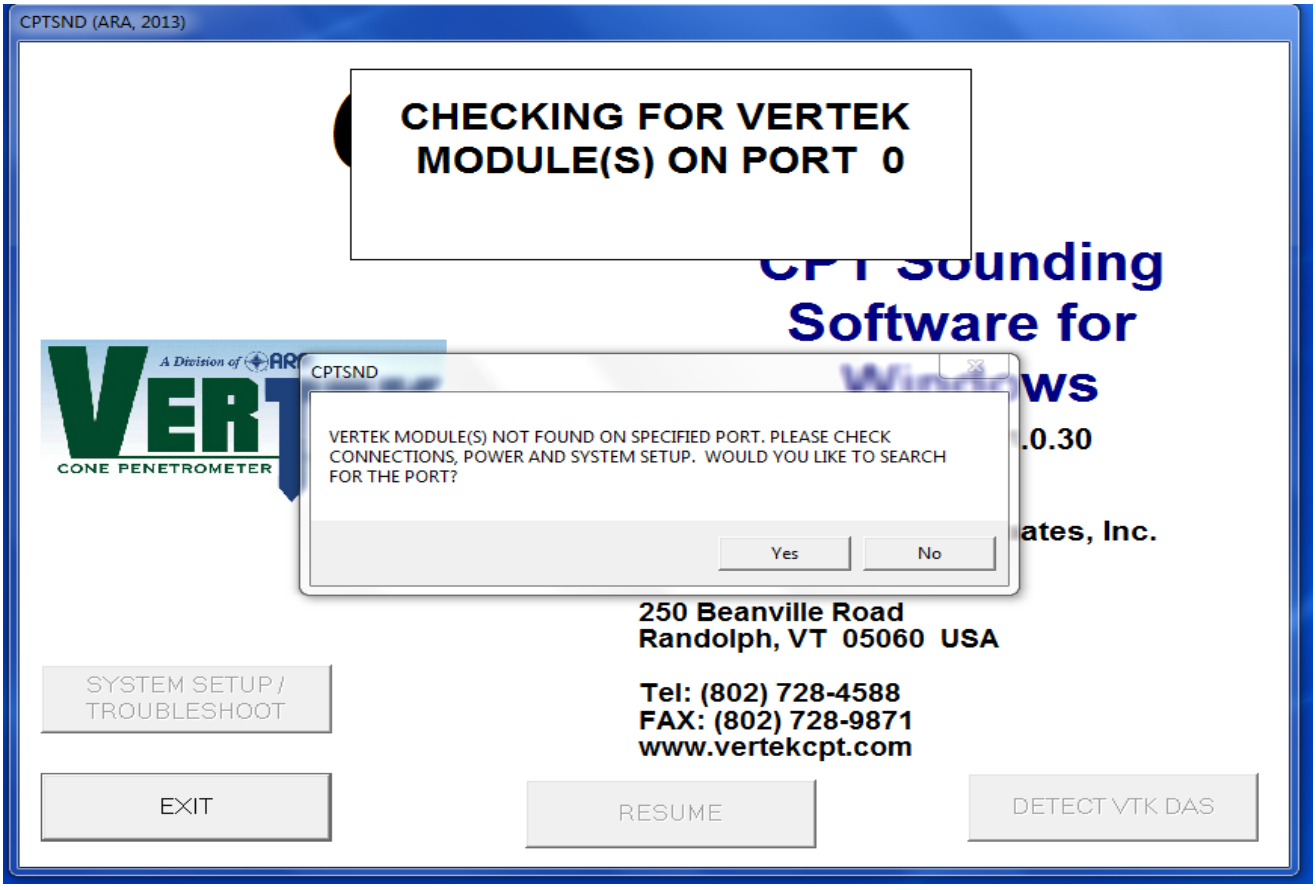


Figure 38 Looking for Modules

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.

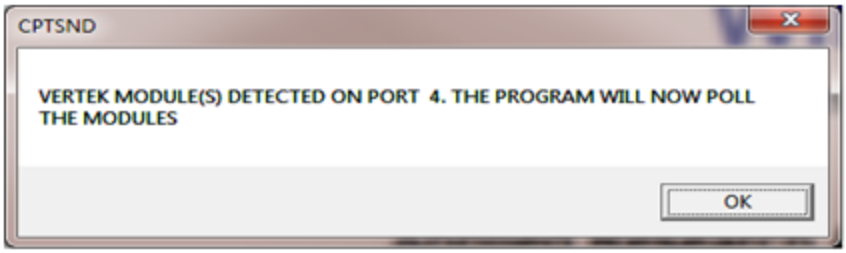


Figure 39 Modules Detected

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.

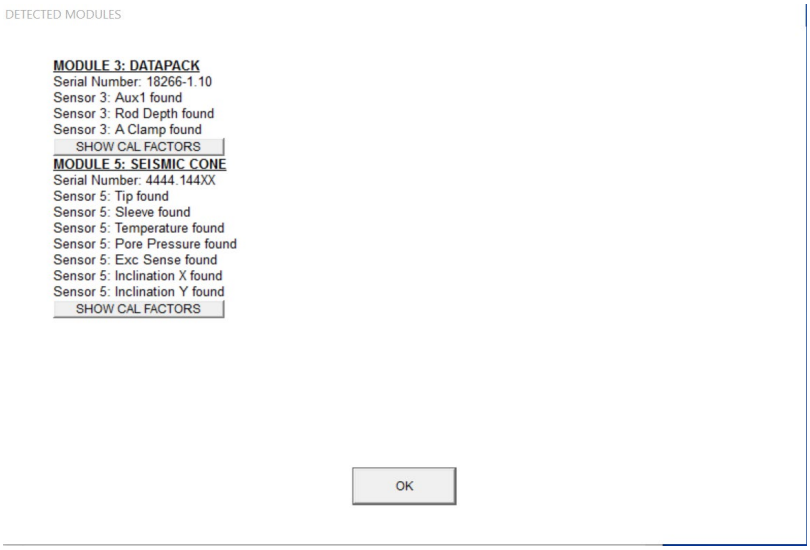
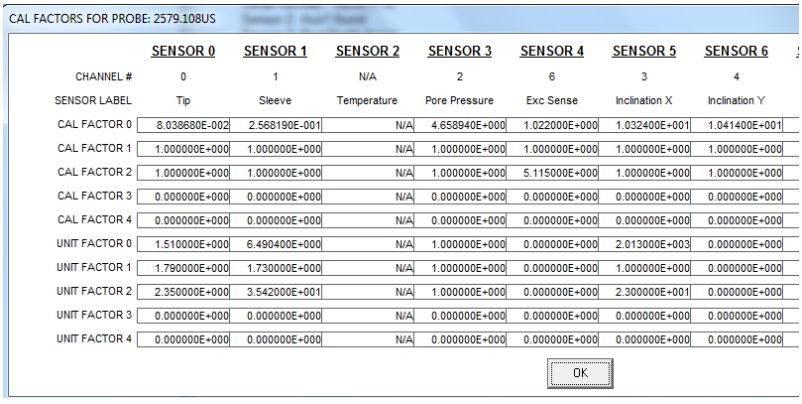


Figure 40 Modules Found Screen

And this is what the SHOW CAL FACTORS tab will display



	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+001
CAL FACTOR 1	1.000000E+000	1.000000E+000	N/A	1.000000E+000	1.000000E+000	1.000000E+000	1.000000E+000
CAL FACTOR 2	1.000000E+000	1.000000E+000	N/A	1.000000E+000	5.115000E+000	1.000000E+000	1.000000E+000
CAL FACTOR 3	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000
CAL FACTOR 4	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000
UNIT FACTOR 0	1.510000E+000	6.490400E+000	N/A	1.000000E+000	0.000000E+000	2.013000E+003	0.000000E+000
UNIT FACTOR 1	1.790000E+000	1.730000E+000	N/A	1.000000E+000	0.000000E+000	1.000000E+000	0.000000E+000
UNIT FACTOR 2	2.350000E+000	3.542000E+001	N/A	1.000000E+000	0.000000E+000	2.300000E+001	0.000000E+000
UNIT FACTOR 3	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000
UNIT FACTOR 4	0.000000E+000	0.000000E+000	N/A	0.000000E+000	0.000000E+000	0.000000E+000	0.000000E+000

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.

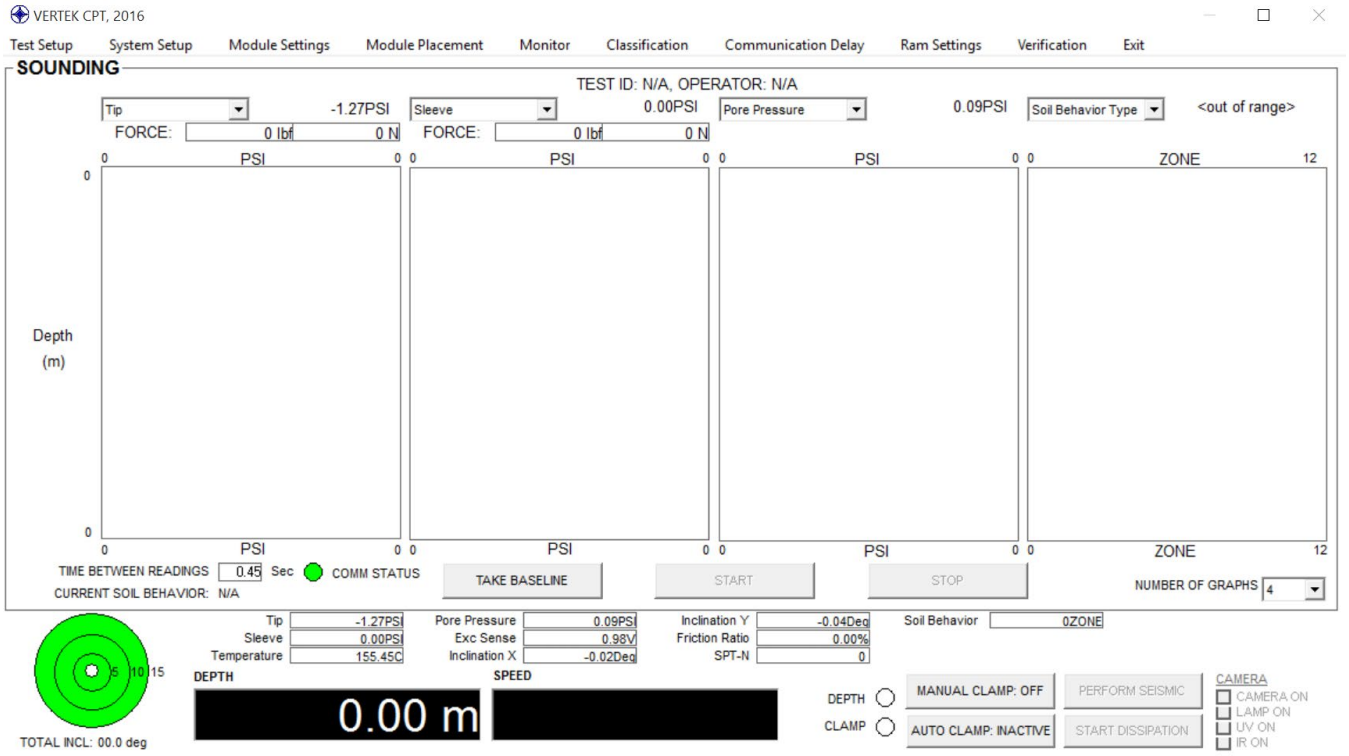


Figure 41 Sounding Screen (shown in outdoor display mode)

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.

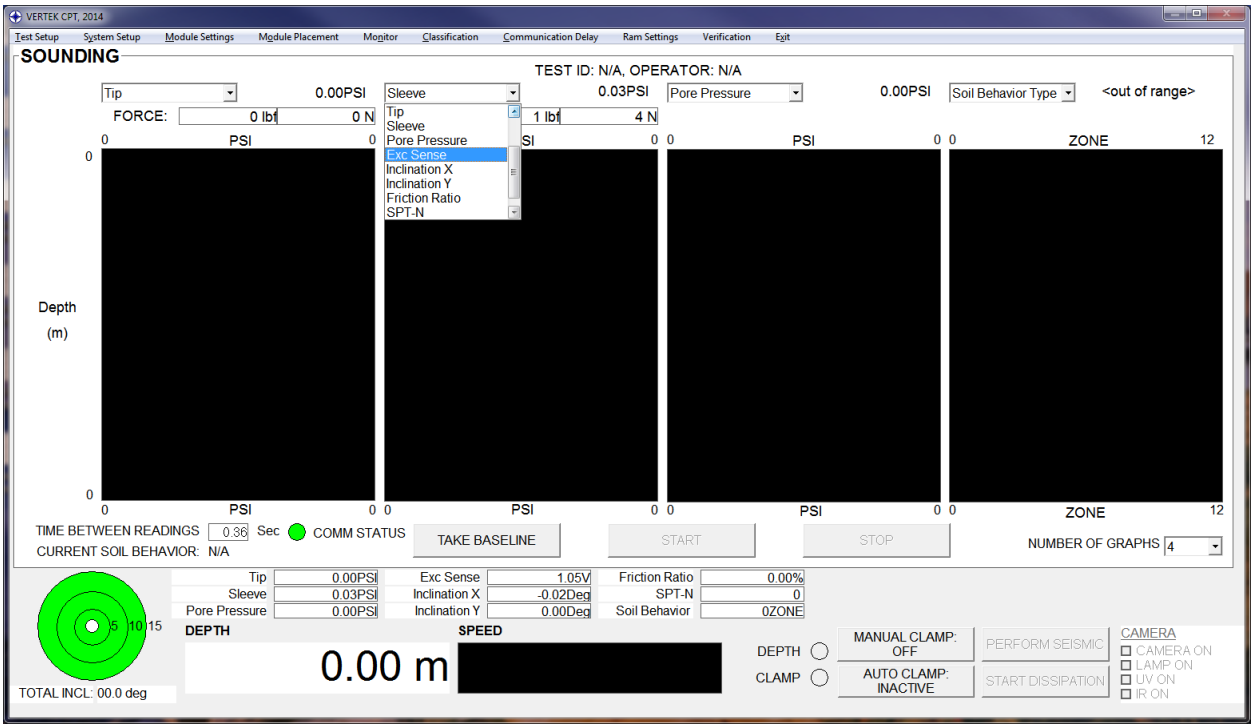


Figure 42 Test screen with a drop down open (shown in indoor display mode)

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)

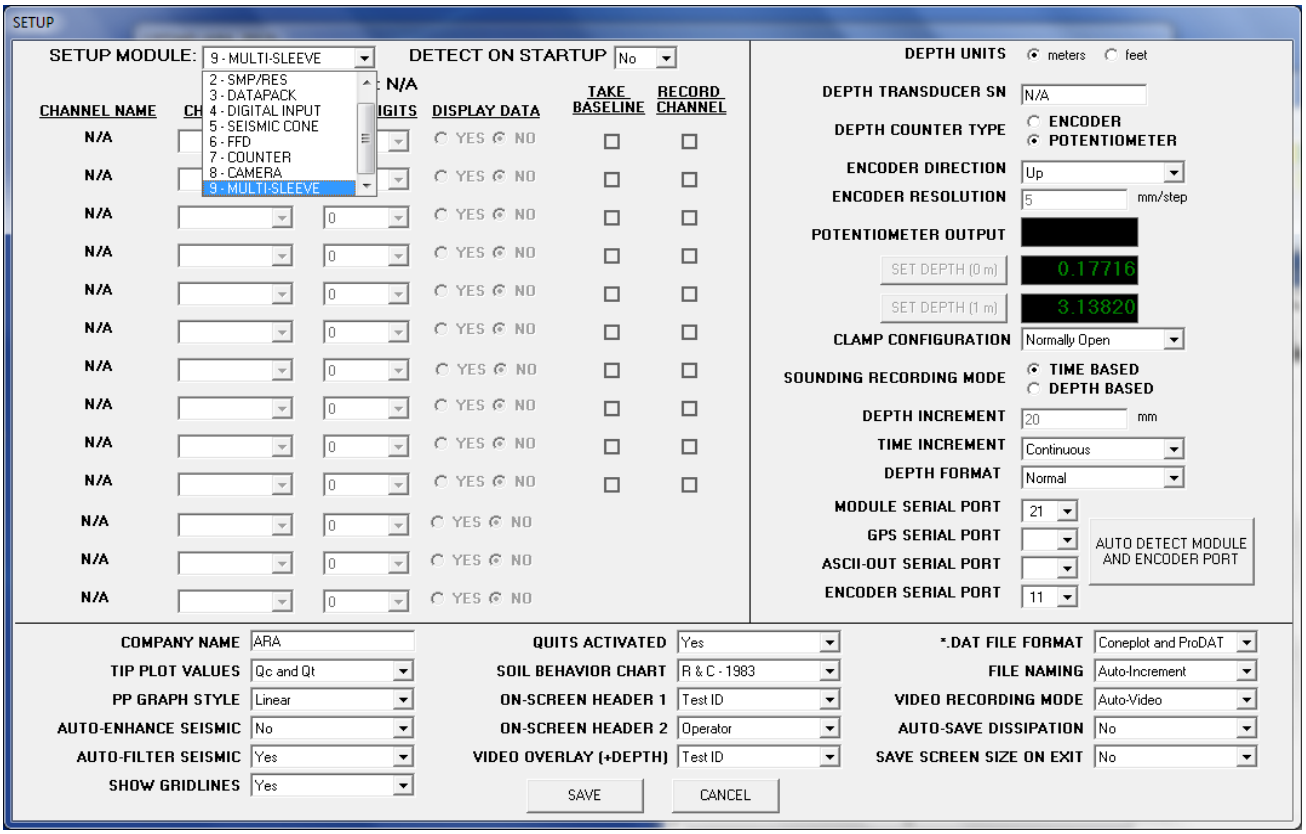


Figure 43 Setup screen with module drop down open/ string pot selected

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 **exactly one meter** 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:

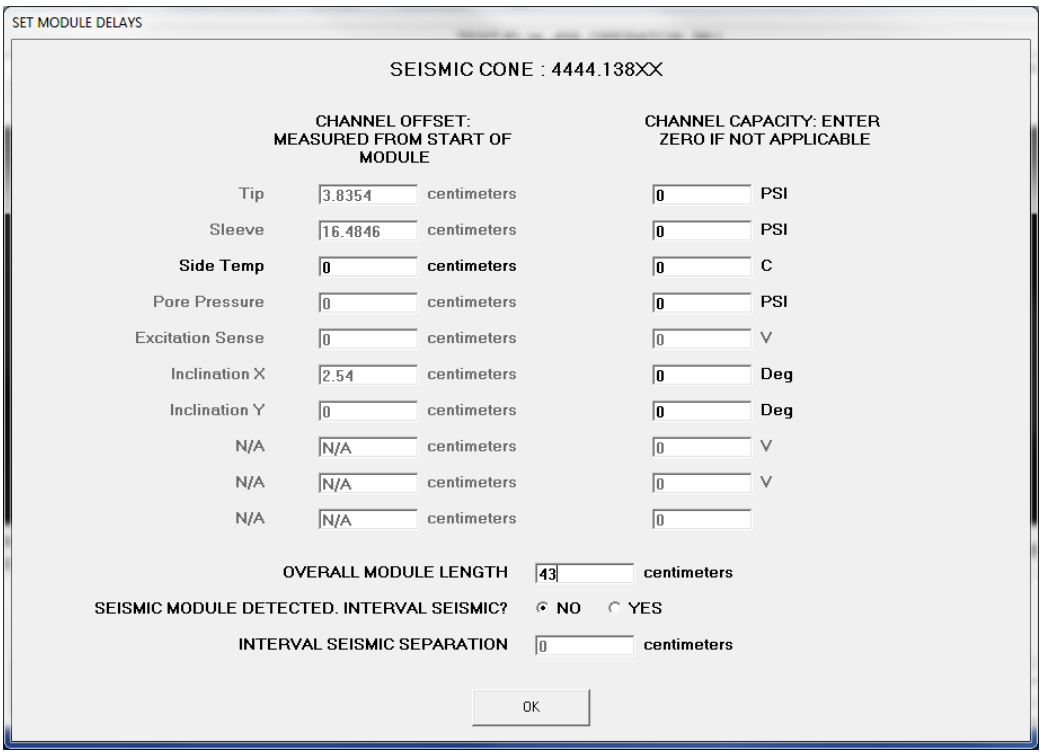


Figure 44 Set Module Delays

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.

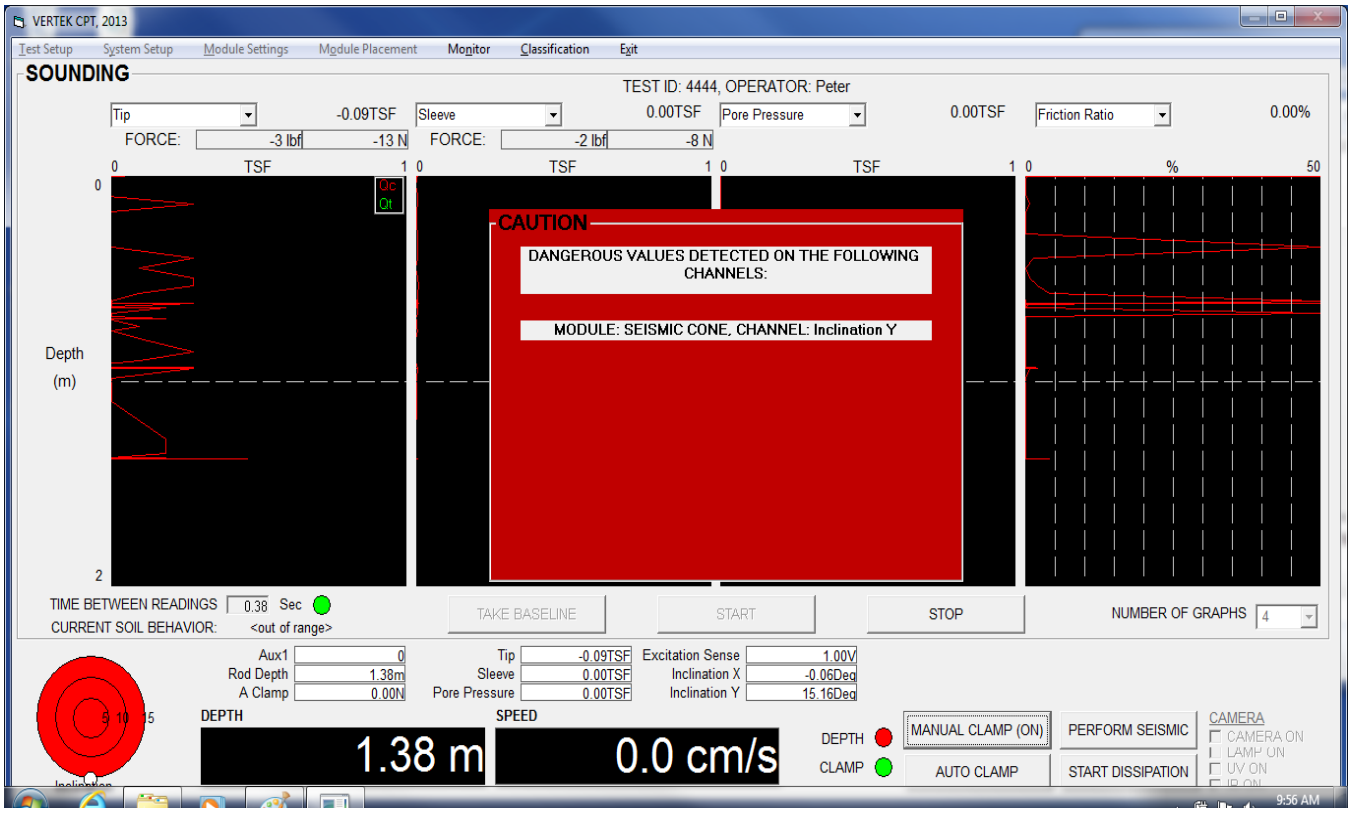


Figure 45 Overload sample screen

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

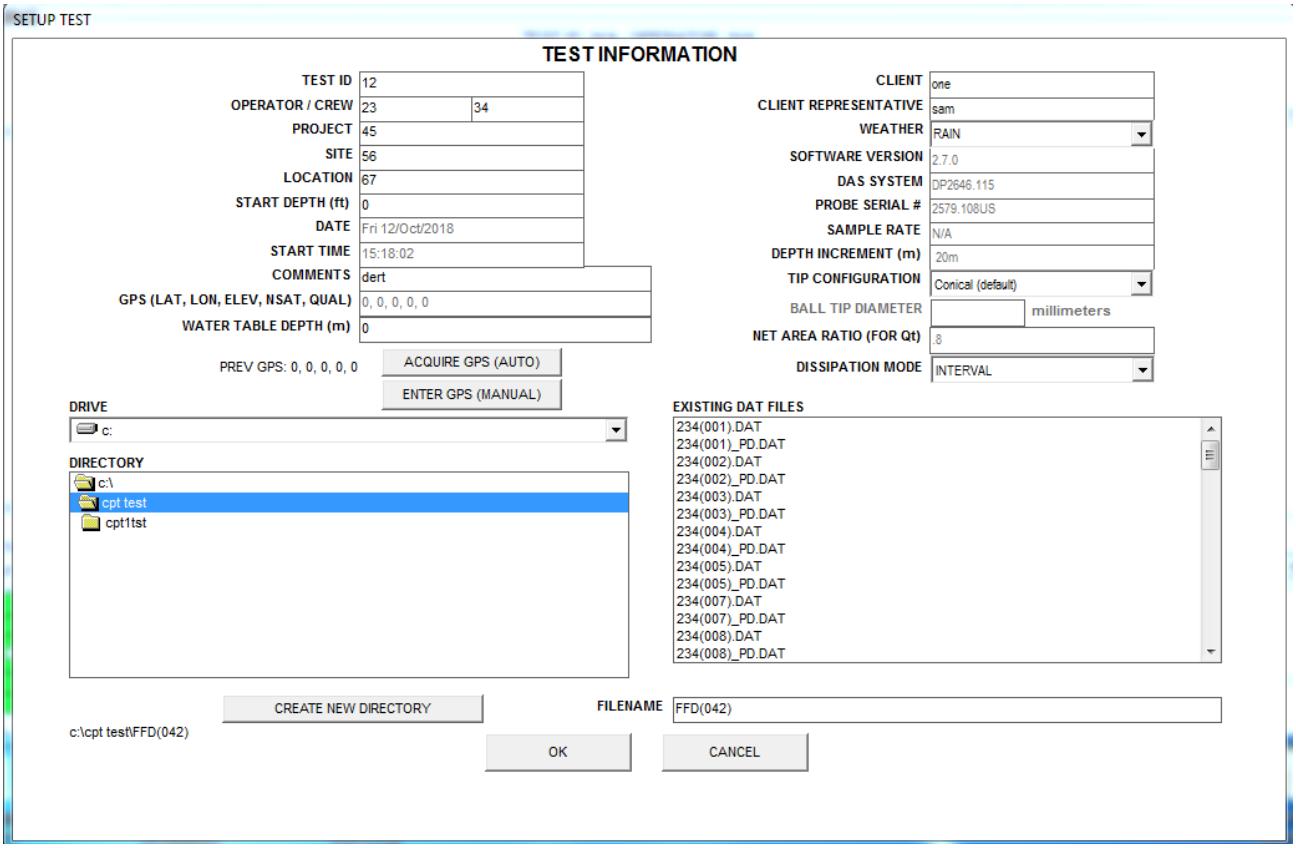


Figure 42 Setup Test Screen

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.

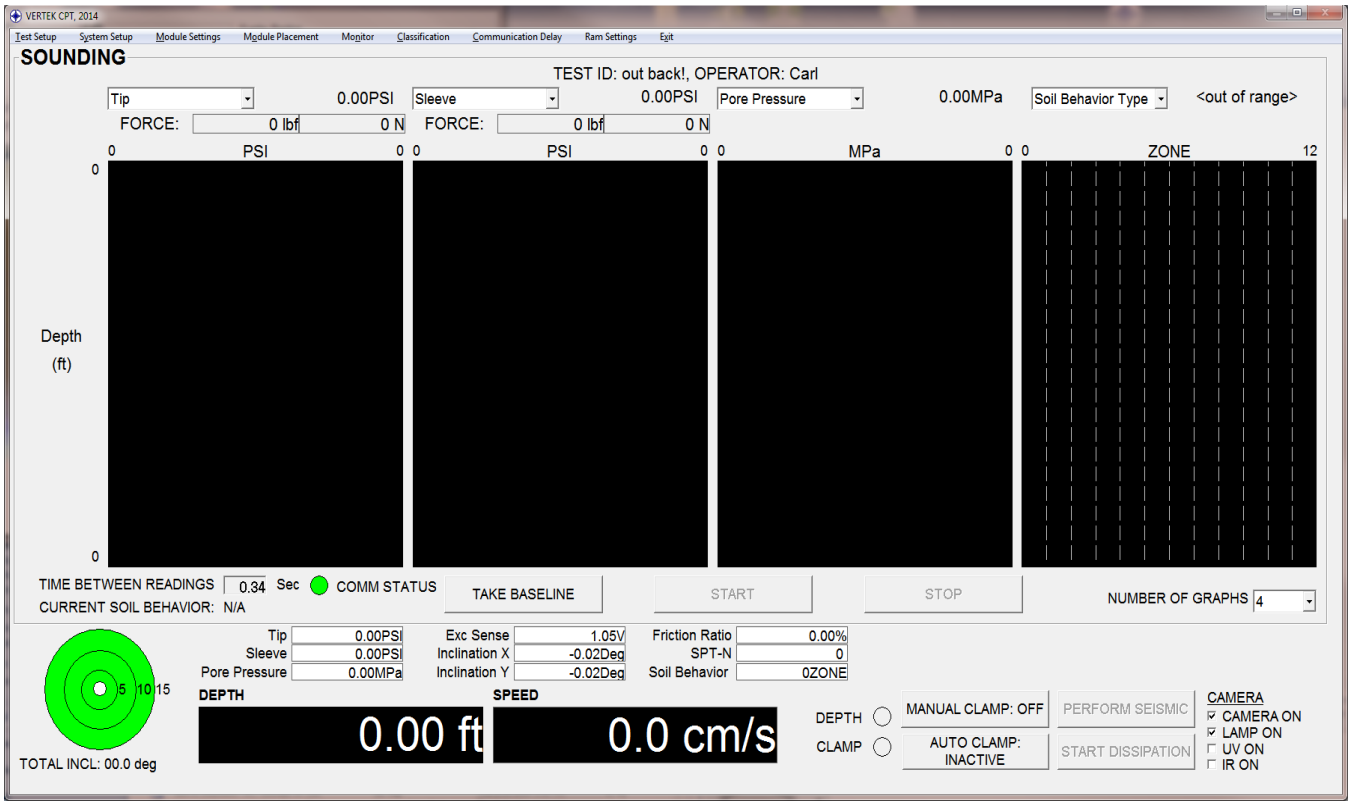


Figure 43 Sounding Screen

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.

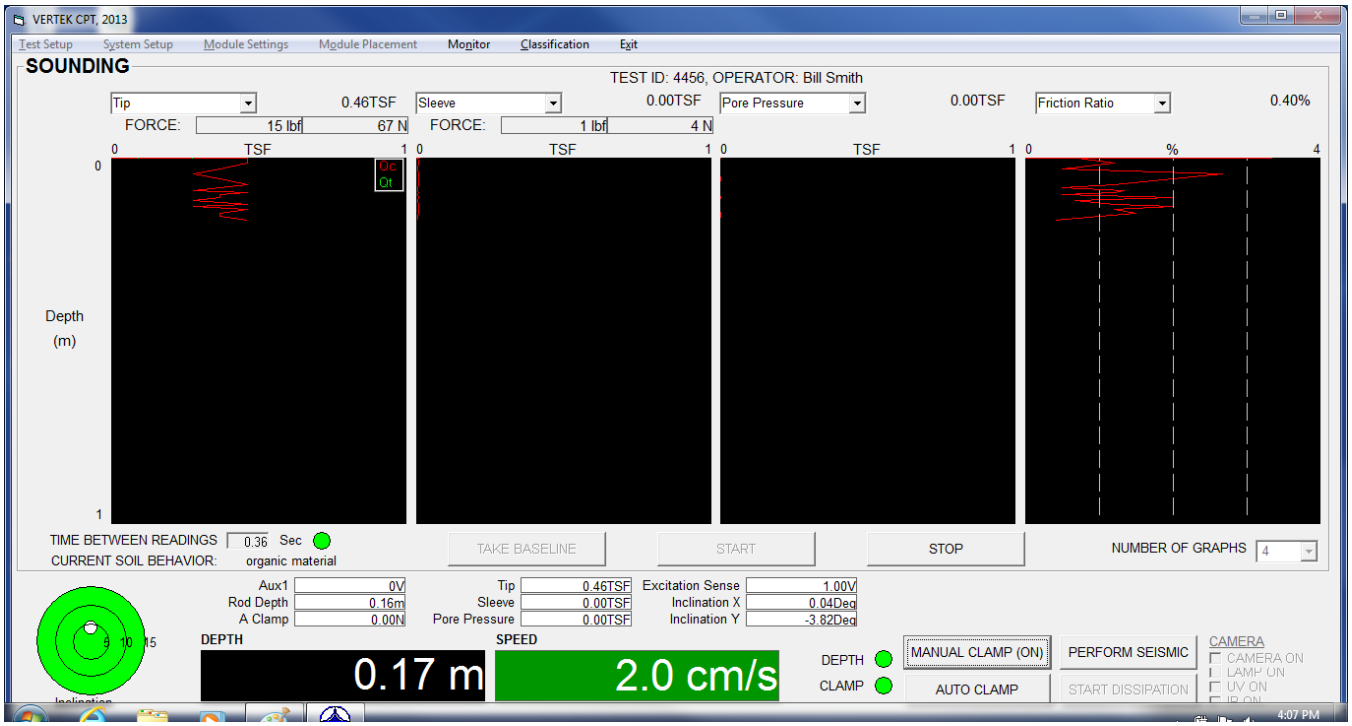


Figure 44 Sounding screen with push in progress

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 assembly makes an excellent strike plate. If a 20-ton truck is not used, DO NOT USE the leveling jacks 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:

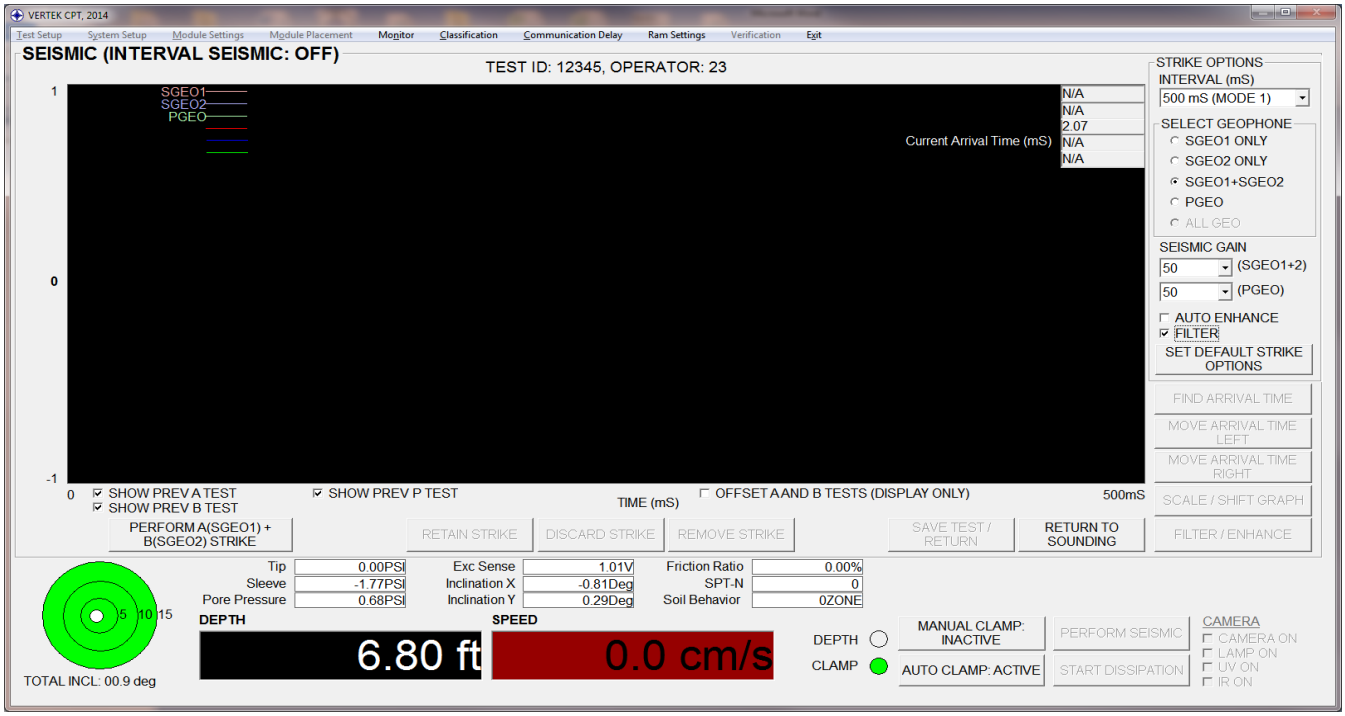


Figure 46 Seismic test screen

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)

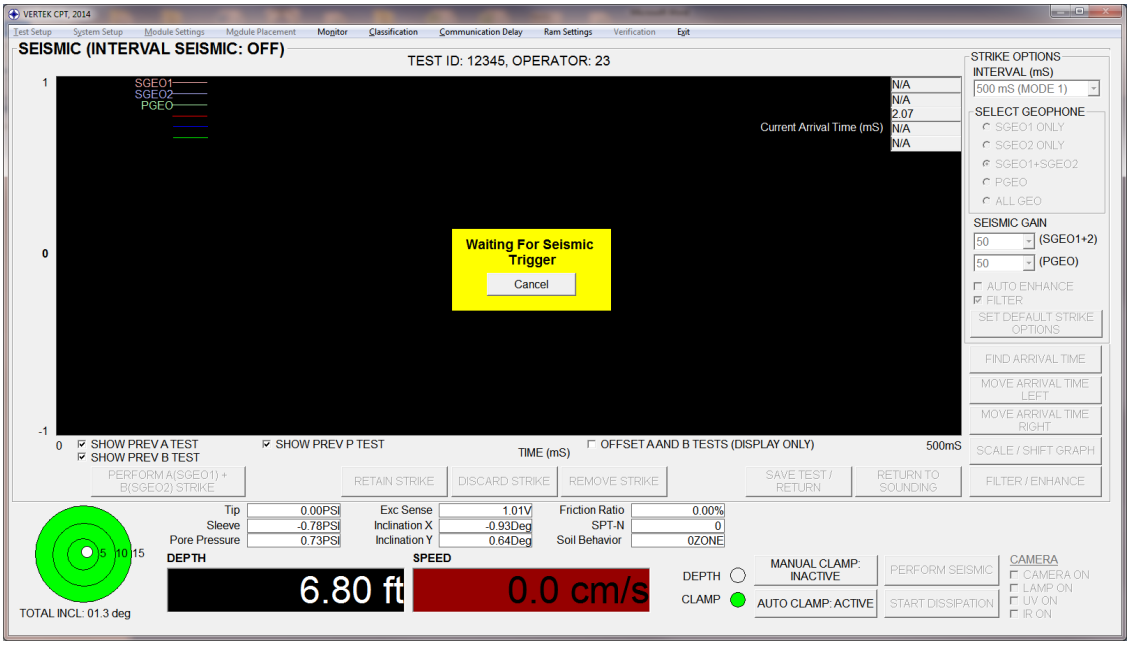


Figure 52 Waiting for Trigger

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.

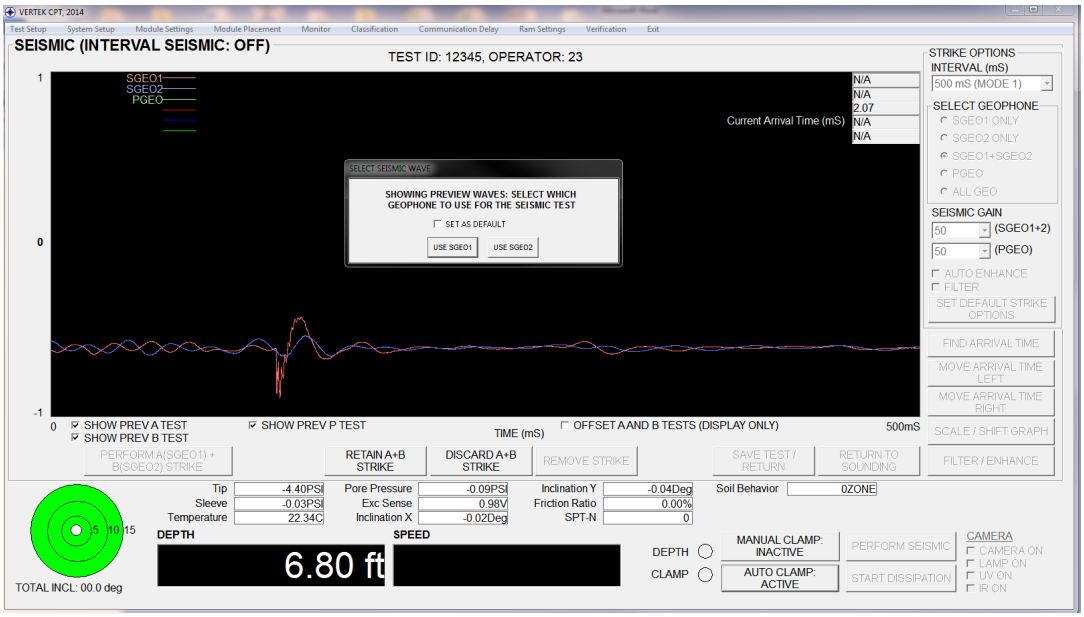


Figure 53 Initial strike

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.

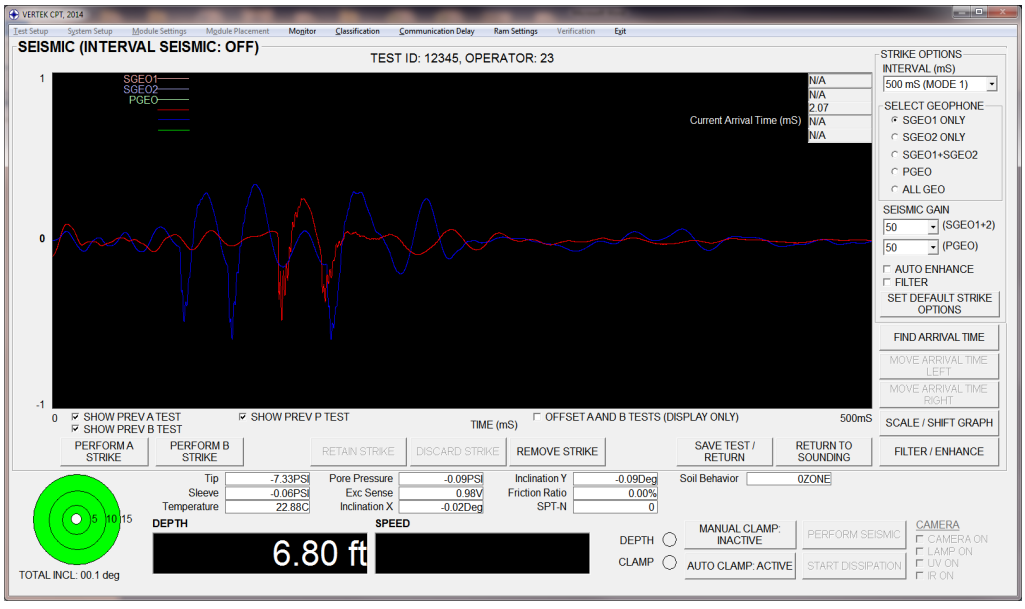


Figure 54 with A & B strike

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.

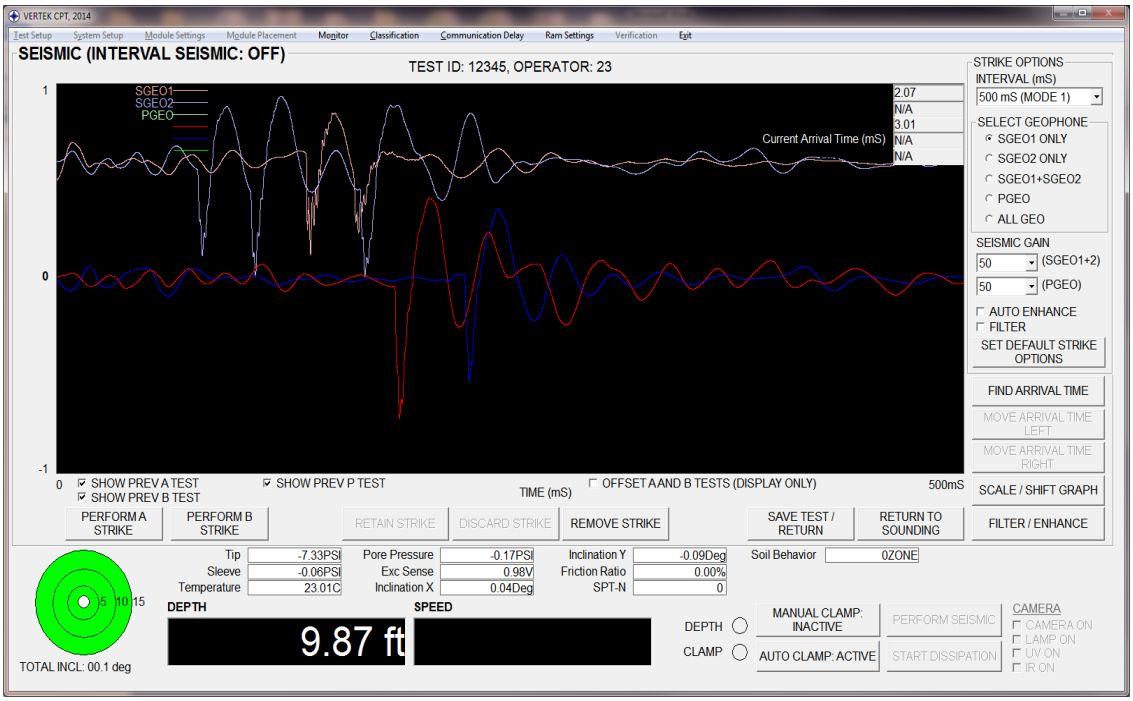


Figure 55 Seismic test with two depths of A & B strikes

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 pre-determined 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

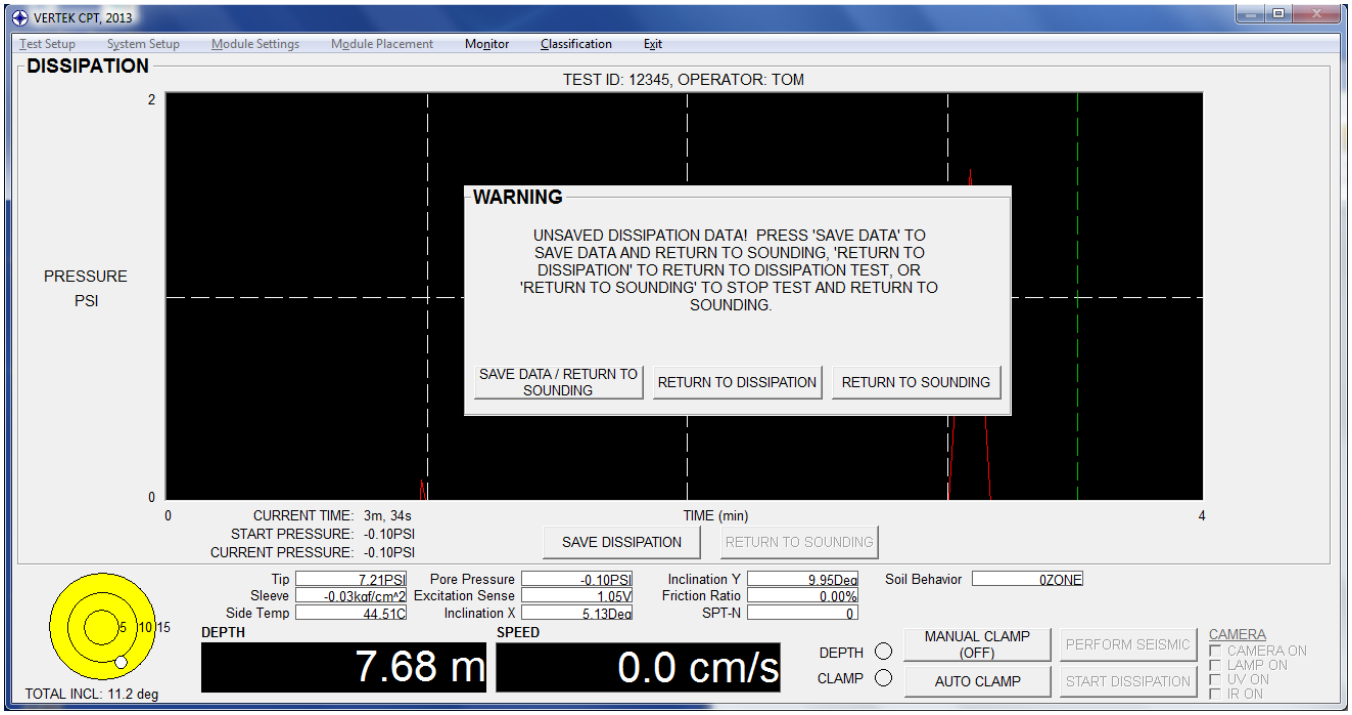


Figure 61 Dissipation unsaved warning

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.

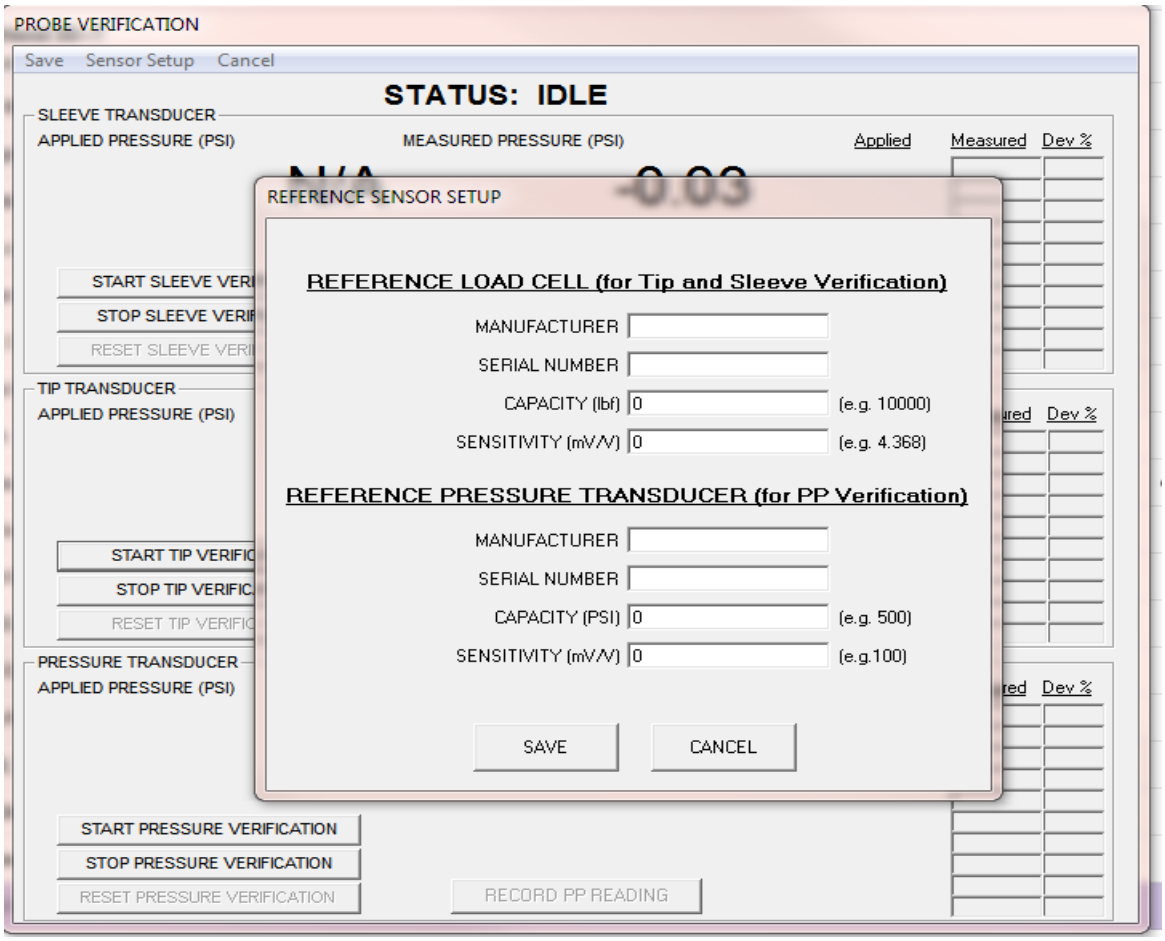


Figure 62

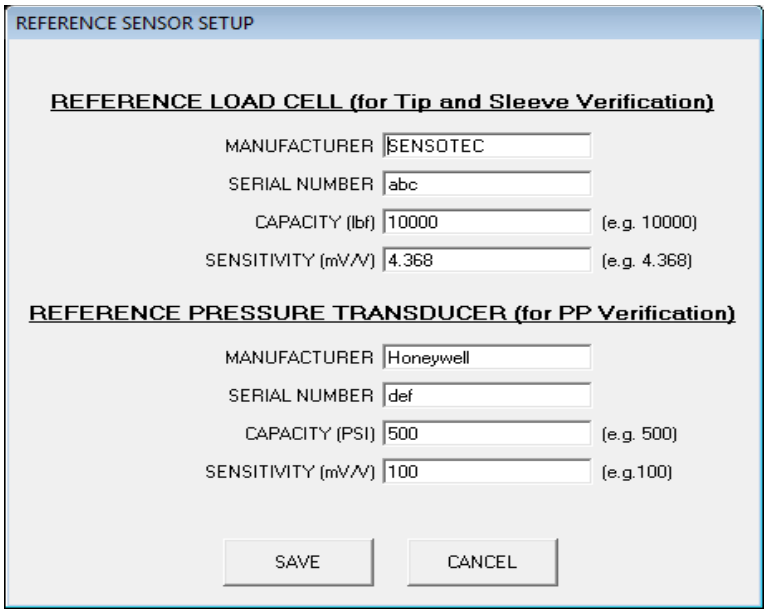


Figure 63

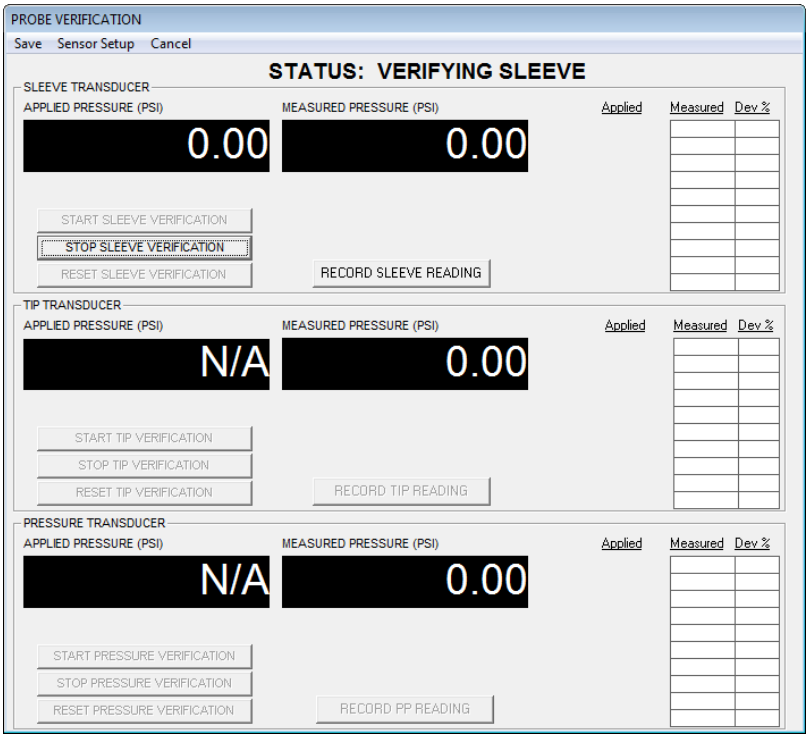


Figure 64

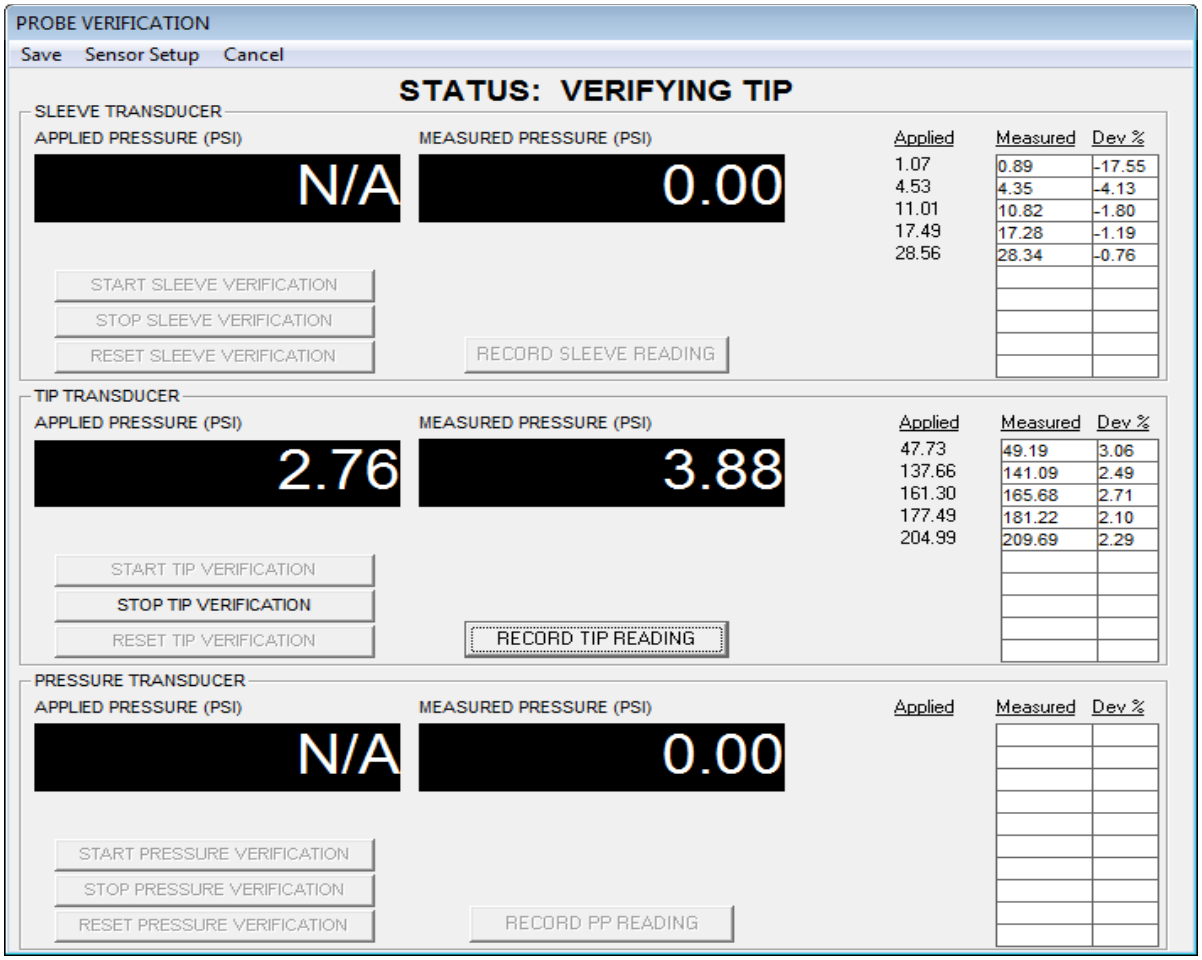

PROBE VERIFICATION
Save
Sensor Setup
Cancel
STATUS: VERIFYING TIP
SLEEVE TRANSDUCER
APPLIED PRESSURE (PSI)
N/A
MEASURED PRESSURE (PSI)
0.00
START SLEEVE VERIFICATION
STOP SLEEVE VERIFICATION
RESET SLEEVE VERIFICATION
RECORD SLEEVE READING
Applied
Measured
Dev %
1.07
4.53
11.01
17.49
28.56
0.89
-17.55
4.35
-4.13
10.82
-1.80
17.28
-1.19
28.34
-0.76
TIP TRANSDUCER
APPLIED PRESSURE (PSI)
2.76
MEASURED PRESSURE (PSI)
3.88
START TIP VERIFICATION
STOP TIP VERIFICATION
RESET TIP VERIFICATION
RECORD TIP READING
Applied
Measured
Dev %
47.73
137.66
161.30
177.49
204.99
49.19
3.06
141.09
2.49
165.68
2.71
181.22
2.10
209.69
2.29
PRESSURE TRANSDUCER
APPLIED PRESSURE (PSI)
N/A
MEASURED PRESSURE (PSI)
0.00
START PRESSURE VERIFICATION
STOP PRESSURE VERIFICATION
RESET PRESSURE VERIFICATION
RECORD PP READING
Applied
Measured
Dev %

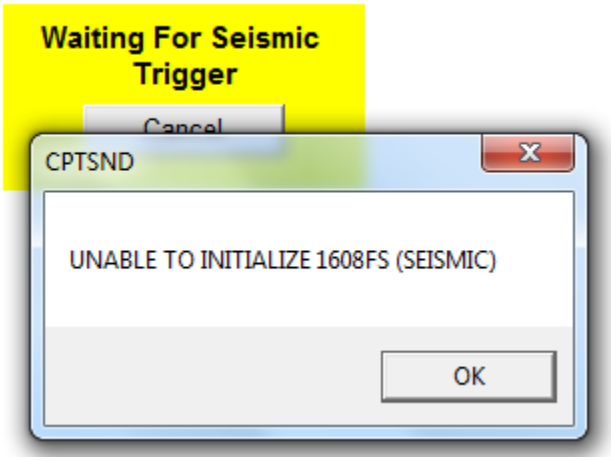
Figure 65

IX. Troubleshooting

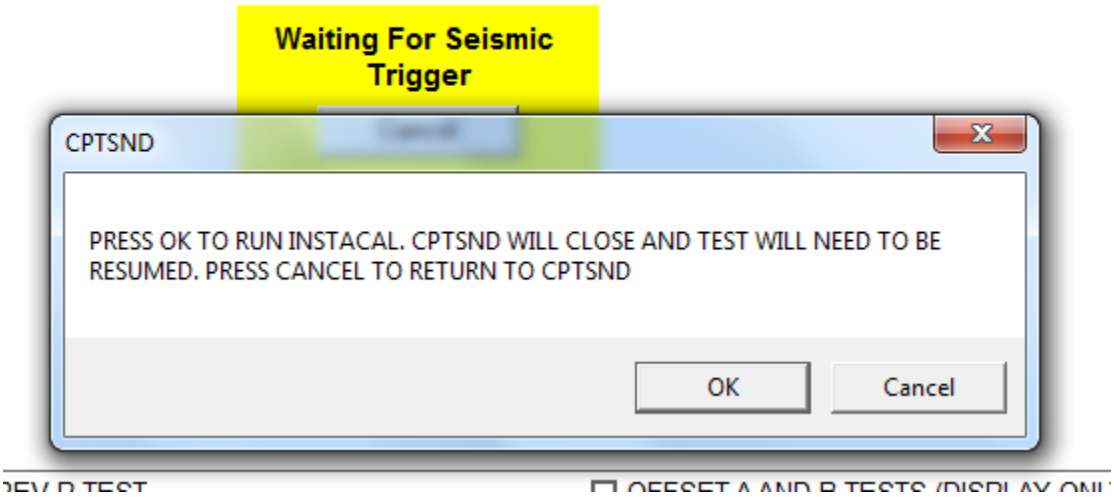
QUITS Not Activating –

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

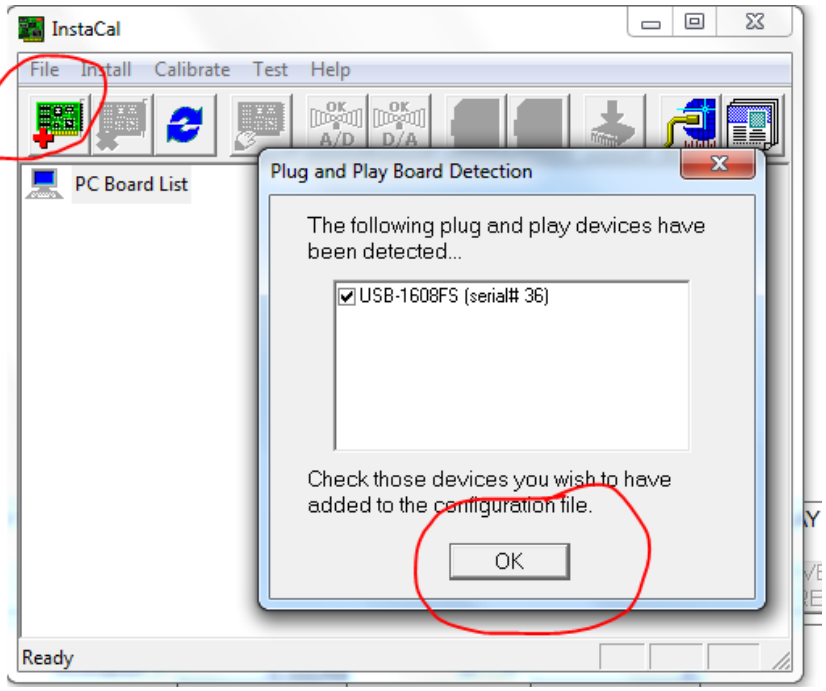
UNABLE TO INITIALIZE 1608FS (SEISMIC)



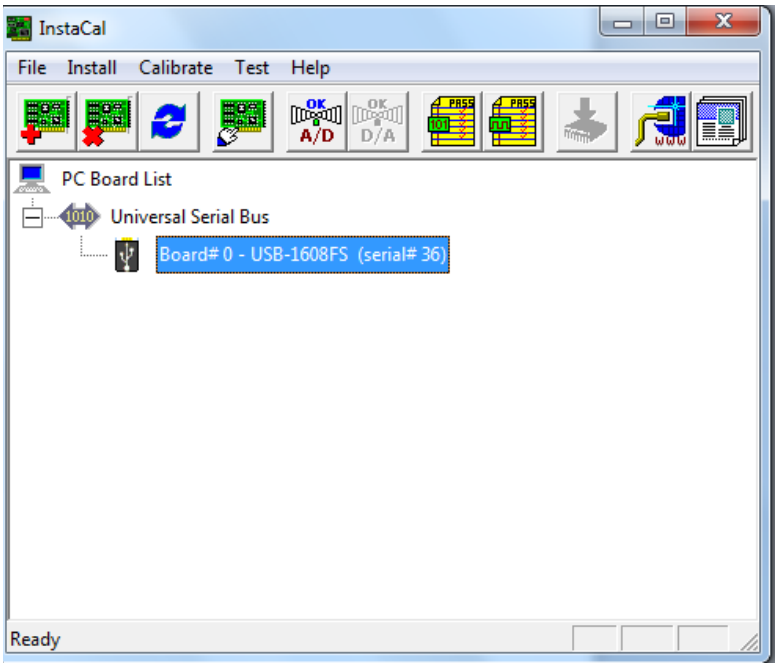
Click okay and then click okay again on below tab



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 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.