The Temperature 2 Pressure Probe (T2P): Deployment Manual

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INTRODUCTION

INTRODUCTION

The University of Texas (UT) has developed a pressure probe to be referred to as 'The Temperature Two Pressure Probe' (Figure 1) or T2P, for short (Flemings et al., 2006). The T2P is composed of interlocking steel cylinders tipped with a needle shaft housing two porous pressure ports and a temperature sensor. Within the DAQ Housing of the probe is an IODP-USIO developed data acquisition system (CDAQ) (Meiring, 2008) adapted for the specific uses of the T2P.

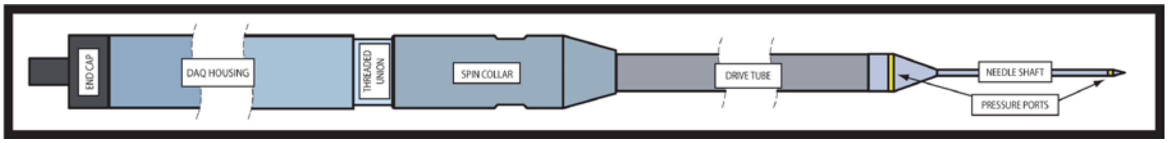


Figure 1: Diagram of Temperature Two Pressure Probe (T2P)

The CDAQ is an inclusive controller and data logger for the T2P. It operates an onboard accelerometer, onboard thermistor, and (1) thermistor and (2) analog pressure transducers that sample in-situ conditions at the tip of the probe. The program T2PLOGGR.run is housed on the CDAQ and is initiated by an external computer via serial cable. It is terminated by user command. The subsequent data are analyzed by a separate post-processing program (T2PImport.xls).

PART 2:

CONNECTION OPTIONS

The T2P will have various connection configurations depending on the situation.

2.1. PRE-ASSEMBLY

During normal operation of the CDAQ, before it is housed within the body of the T2P, the user will likely use a testing cabling, where one end terminates into a 3-pin Fischer connection and the other terminates into a DB-9 serial connector. This connection configuration is useful for checking the characteristics of transducers, altering programs, and transferring data. The user will have read and write access through HyperTerminal.

2.2. POST-ASSEMBLY

After the tool is assembled, and the CDAQ is no longer readily accessible, the user is no longer capable of making modification to the transducers. However, with the use of the “Assembly Cable”, the user can connect to the CDAQ via the IE4 connector on the T2P endcap. This cable allows full two-way connection, which means the programs can still be started, stopped and downloaded.

2.3. DEPLOYMENT

When the tool is set to be deployed, the IE4 is closed with an IE4 dummy. At this point the tool is isolated from communication. It will require reconnecting the “Assembly Cable” to terminate the logging program

PART 3:
DEPLOYMENT OF THE T2P

3.1. INTRODUCTION

The IODP downhole tools are generally deployed using the drill string and/or coring line in several possible modes: (a) lowered on the coring line to either seat in the bit or run beyond the bit in open hole, (b) lowered to the bit as part of a coring assembly, (c) dropped down the drill pipe under "free-fall" conditions and later retrieved using the coring line, (d) built into the drill string, or (e) installed for long times in the seafloor. Often, the use of a particular downhole tool or technology (perhaps a combination of tools) requires careful advance planning in terms of the bottom-hole assembly (BHA) run at the end of the drill pipe.

3.2. DEPLOYMENT OF T2P:

3.2.1. OVERVIEW

The T2P delivery and drive assembly interfaces with the drill string and is integrated into the IODP operational protocols. We will use the Motion De-coupled Hydraulic Delivery System (MDHDS) to deploy the T2P.

3.2.2. GREASE PROTOCOL:

1. Make sure the threads and O-ring groove are clean before greasing.
2. Grease the three O-rings with silicone grease.
3. Cover the large diameter thread with Mylar and put O-ring into groove.
4. Remove the Mylar and grease the thread with SS-30 or other copper anti-seize lubricant.
5. Be careful not to spread the anti-seize for threads onto the O-ring and O-ring groove.

3.2.3. ASSEMBLY PROCEDURE FOR THE T2P TIP AND DRIVE TUBE:

6. Select two pressure transducers and one thermistor with attached needle assembly and record ID numbers on Deployment Sheet.

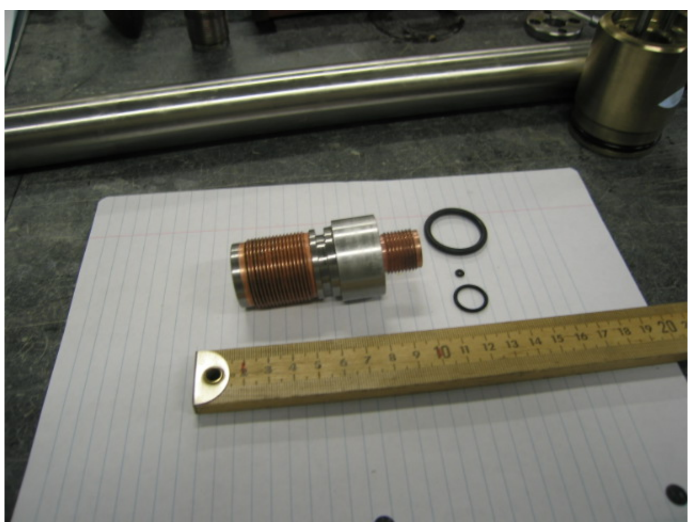


Figure 2: Transducer Block and O-rings

7. Place transducer block, needle shaft, and 2 remaining transducer block O-rings in water.
8. Put a tooth brush into the water tank and de-air the toothbrush.

9. Use squirt bottle to expel air from all conduits within the needle shaft and transducer block. Use brush to de-air internal threads of needle and external threads of block.
10. Place small and medium O-rings in position at the base of the transducer block. Verify that there is an O-ring inside the cone of the needle.
11. Place porous rings in a container of boiling water for twenty minutes.
12. Immediately after boiling, transfer rings to an ultrasound bath for 45 minutes.
13. Transfer rings to a sealed container completely filled with de-aired and distilled water.
14. Open container with rings under water. Work with the saturated porous rings under water: never let the porous rings become exposed to air.
15. Put the large porous ring onto the shoulder of the needle shaft.

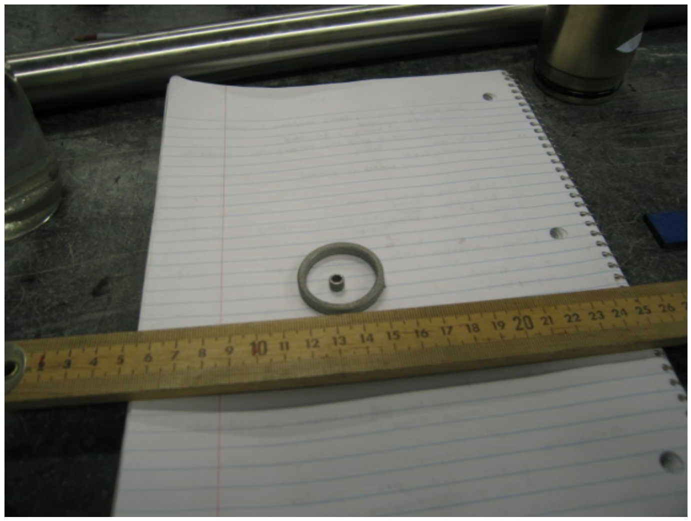


Figure 3: Porous Rings

16. Twist (or lightly solder) thermistor wire ends together (soldering makes later assembly easier).
17. Put the tip underwater. De-air the tip threads with toothbrush.

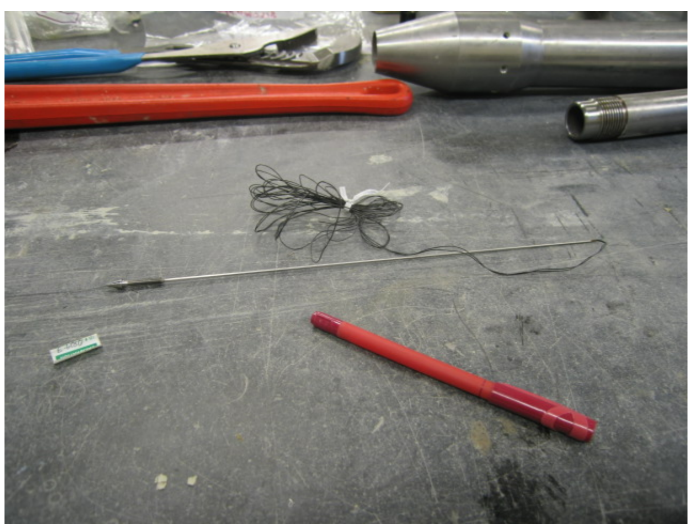


Figure 4: Thermistor Tip

18. Thread the thermistor wires through the small porous ring. Slide ring onto the base of the thermistor tip.
19. Put the thermistor wires through the hole at the tip end of the needle shaft under water; make sure the wires come out of the center hole at top of needle (inside cone).

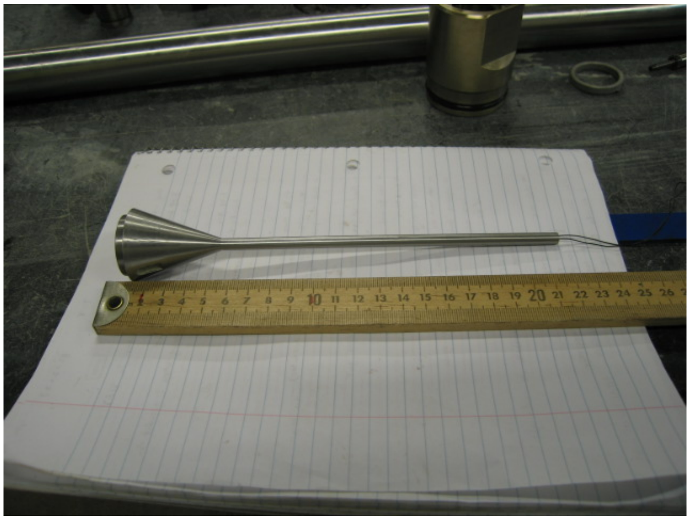


Figure 5: Needle Shaft

20. Screw the thermistor tip onto the needle by turning the needle shaft, and then tighten using the tip tool (0.050” Allen wrench).

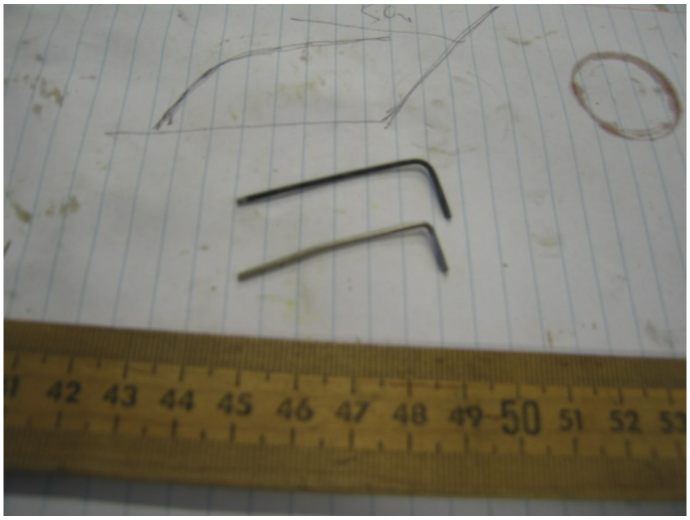


Figure 6: Tip Tool

21. Run thermistor wires and tube through center hole of transducer block. Screw the transducer block into the needle shaft by rotating the block. Tighten connection using the needle spanner wrench and the needle shaft wrench.

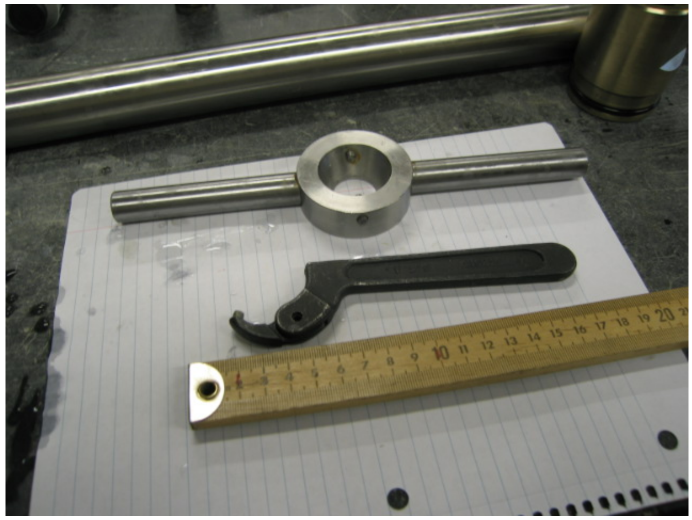


Figure 7: Needle Spanner Wrench and Needle Shaft Wrench

22. Confirm that O-rings are on both.
23. De-air the threads on the pressure transducers using brush (keep the Fischer connector dry).

Note: minimize the time the transducer back is exposed to water as this end is not sealed. Work quickly and keep the transducer as close to the surface as possible.

NOTE: To identify which transducer is connected to the tip and which to the shaft: when the spanner wrench hole on the transducer block is facing you with the probe needle facing down, the pressure port on your right is for the tip pressure transducer and the left pressure port is for the shaft pressure transducer.

24. Screw the pressure transducer onto the transducer block by hand (be sure all the operations are done under water and not to twist the pressure transducer wires).
25. De-air the seals for the porous rings, if available, and put them onto the tip and shaft porous rings underwater: rubber tube with plug for the tip, plastic sleeve for shaft; or enclose in response tube.
26. Remove from water and tighten transducers to 15 in-lbs. with torque wrench.
27. Screw two hexagonal standoffs to transducer block.
28. Screw T-shaped end bracket onto standoffs using 8-32 screws.
29. Screw the tip labeled end of the aluminum backing plate to the T-shaped end bracket using 4-40 socket cap screws.
30. Screw curly cable bracket onto DAQ labeled end of the backing plate using 4-40 socket cap screws.
31. Slide thermistor wires and thin metal tube through T-shaped bracket. Unsolder the wires.
32. Solder each loose thermistor wire to one of the loose wires coming from the Fischer plugs: first put on the right size heat shrink tubing, solder the wires, then shrink the tubing to cover and protect the connections.
33. Slide the Fischer receptacles through the hole in the curly cable bracket towards the probe tip.
34. Connect Fischer plugs and receptacles: note the serial number of each transducer, and note which transducer is attached to channel 1 and channel 2. Channel 1 corresponds to U7-A1, and channel 2 corresponds to U7-A2.

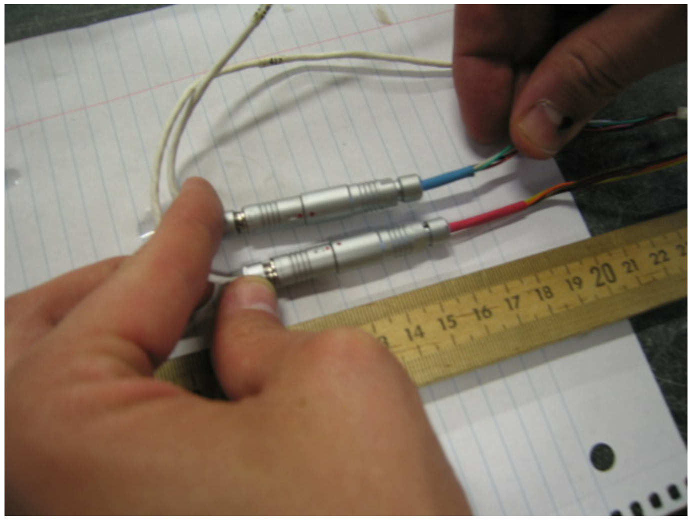


Figure 8: Fischer Connectors

35. Use electrical tape to secure the wire harness to the backing plate.
36. Pass a draw string through the drive tube from the external threaded end and tie it to the large (19-pin) Fischer connector on the coiled cord.
37. Slide the drive tube over the backing plate, while keeping the draw string in tension to stabilize the board and to pull the coiled cord from the end of drive tube.
38. Screw the drive tube to the transducer block by rotating drive tube (hand-tight) while maintaining tension on the string.
39. Slide spin collar over drive tube with cone towards tip.
40. Insert the Fischer retainer into the top of the drive tube beneath the Fischer connector to protect and position the wires.

Figure 9: Fischer Retainer

41. Properly clean and insert the two O-rings on the drive tube nut. Grease male threads on drive tube using copper anti-seize.

Figure 10: Drive Tube Nut

42. Screw the drive tube nut onto top of the drive tube and tighten it with square wrench on nut and needle shaft wrench on transducer block, while applying tension to coiled cord so that connector just extends out of the drive tube nut.

3.2.4. ASSEMBLY PROCEDURE FOR THE T2P THREADED UNION:

43. Grease and insert O-rings onto Greene Tweed pass through.
44. Screw ground nut to the Fischer receptacle. Then slide Fischer washer over receptacle, and secure Fischer washer with the thin, flat nut.
45. Slide wire assembly through threaded union from tip end to DAQ end so that the 15-pin mdm connector extends from the DAQ end of the threaded union.
46. Stand threaded union vertically on its DAQ end with clearance for 15-pin mdm connector to dangle. Then place Greene Tweed insertion tool over Greene Tweed connector. Gently tap polished end of tool until the body of the Greene Tweed connector is completely situated in bore of union.

Figure 11: Threaded Union with dangling 15-pin mdm connection

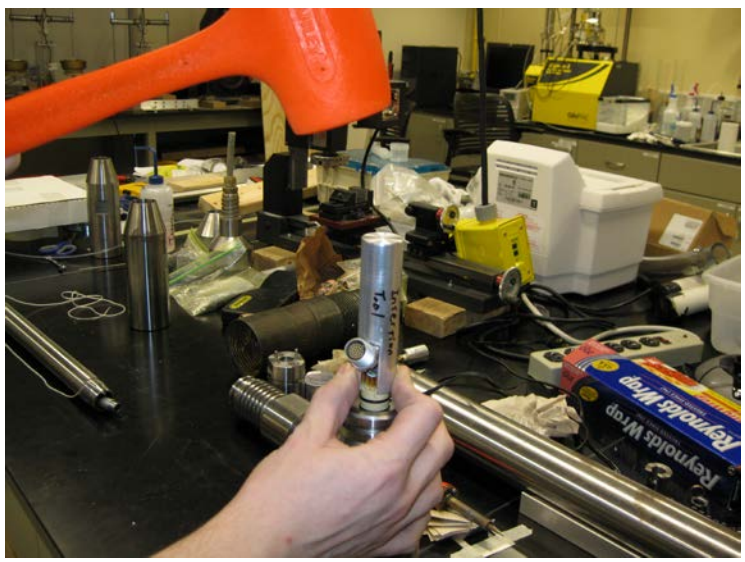


Figure 12: Greene Tweed Connection Procedure

47. Place insertion tube and wires leading from Greene Tweed to poke through to the Fischer connector. Push the whole assembly into threaded union, until Fischer washer is flush with the end of the threaded union.
48. Fasten the Fischer washer with 8-32 socket cap screws.
49. Screw the 2 ½" 8-32 threaded rods into the holes on the DAQ end of the threaded union.
50. Slide a half-round spacer onto each threaded rod.
51. Slide 15-pin mdm bracket onto threaded rods. Set the 15-pin mdm connector into notch on the bracket. Clamp down on the 15-pin mdm connector by tightening the 4-40 socket cap screws.

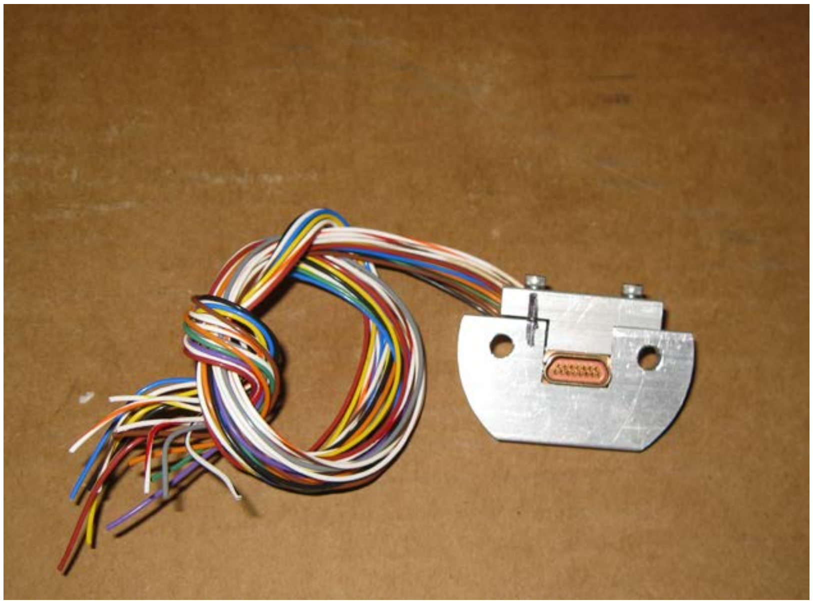


Figure 13: 15-Pin mdm Bracket

52. Grease O-ring grooves and threaded exterior of threaded union on both ends of the threaded union. Install O-rings.
53. Apply a light coating of copper anti-seize grease to the threads of the threaded union.

3.2.5. ATTACHING DRIVE TUBE TO THREADED UNION:

54. Connect Fischer plug from the drive tube nut to the Fischer receptacle on the threaded union. Carefully align drive tube nut and threaded union using locator pins.
55. Slide the spin collar over the drive tube and screw onto the threaded union until snug.

3.2.6. ASSEMBLY PROCEDURES FOR THE DAQ HOUSING:

56. Place CDAQ clamshell housing onto rough surface with flat part of the aluminum backbone facing up.
57. Place CDAQ onto backbone with Persistor inserted into 50-pin header.
58. Align holes on CDAQ with holes in aluminum backbone. Place six standoffs over holes on CDAQ furthest from the 15-pin mdm connection. On the set of holes closest to the mdm connection, place aluminum mdm bulkhead so that its holes align with those of the CDAQ
59. Place top half of the clamshell on top of standoffs with holes aligned and screw 1” 4-40 screws into each hole.
60. Load 7.2V lithium battery onto backbone and ensure it is fully attached to the 9-pin connection on the CDAQ. Secure it to backbone with electrical tape.
61. Install a nylon spacer on each threaded rod then position CDAQ clamshell onto threaded union by sliding aluminum mdm bracket through threaded rods on threaded union.
62. Secure bracket with lock washer and nut on each threaded rod.
63. Attach small Delrin electronics covers to CDAQ clamshell with zip ties.
64. Slide large Delrin electronics cover over battery tube and clamshell.
65. Secure all wires with electrical tape. Attempt to place all wires into the slit in the large white shell.
66. Tie a drawstring to Fischer receptacle from CDAQ.

67. Pass drawstring through DAQ housing, and then pull wires through.
68. Slide DAQ housing over CDAQ clamshell and screw onto threaded union, keeping tension on string.
69. Grease O-rings and O-ring grooves of end cap. Install O-rings. Apply anti-seize to the coarse threads.
70. Pass drawstring and wires through battery compression cap and spring. Slide cap/spring assembly into DAQ housing. Setscrew guides should fit into alignment notches in Delrin cover. Draw the Fischer receptacle through the endcap. Verify that there is an O-ring in the endcap connector plate and one where the connector screws into the plate. Connect the Fischer plug and receptacle. Keeping tension on the Fischer connector via the endcap connector plate, screw the endcap into the DAQ housing. Attach the endcap connector plate to the endcap with ¾" 10-32 socket head screws. Use the spanner wrenches on the threaded union and the endcap to tighten.
71. Use the appropriate wrenches to go back and give every connection a final tightening.

3.2.7. RESPONSE CHECK PROCEDURES

1. If available, connect a witness transducer to the response chamber.
2. Connect witness transducer to a data acquisition system. Make note of the input voltage and the transducer characteristics.

Figure 14: Response chambers with Witness Transducer Port on End

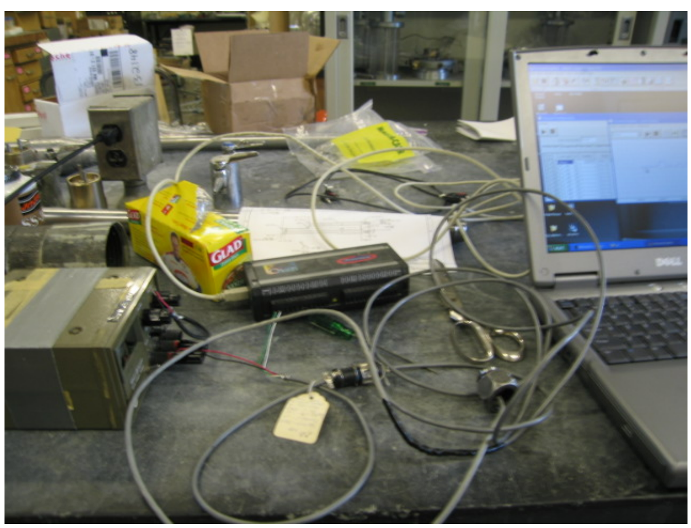


Figure 15: Data Acquisition system

3. The T2P should already be inserted into the response chamber. If not, insert the T2P partway into the chamber with the drainage valve open to allow water to vacate the chamber. Once the T2P is partly within the chamber, with clearance between the tip and the base of the tube, the drainage valve is then closed, thereby sealing the response chamber.
4. Start logging data from tip and shaft transducers at 1-second sampling rate.
5. Apply one or more 5-second pressure pulses to probe by pushing probe into chamber.
6. Stop data collection, save the response file (see file name convention).

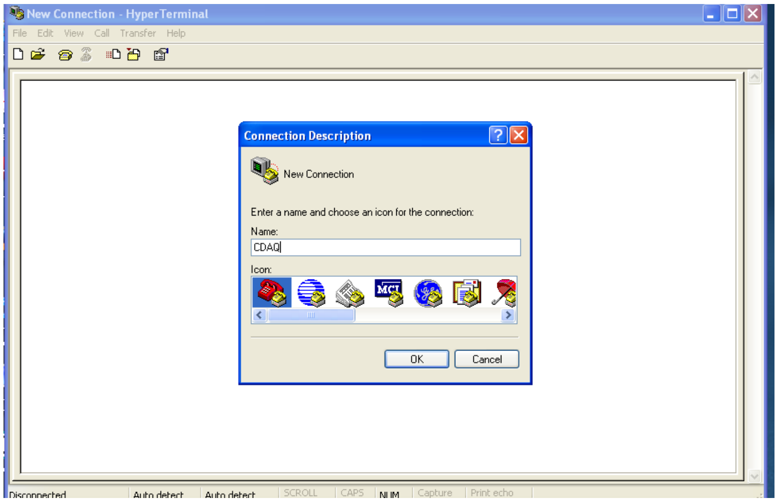
3.2.8. DEPLOYMENT PROCEDURE:

1. Specify the deployment depth, penetration rate, penetration distance and max load.
2. Switch DC power to battery; record battery number and time.
3. Launch HyperTerminal and start logging (see Example of Logging Session below).
4. Assemble DAQ housing as described above.
5. Pressure response to make sure both transducers work.
6. Keep unit in AC as long as possible to reduce temperature variation.
7. Driller lifts the MDHDS to the vertical position on the rig deck.
8. Remove assembly cable and attach dummy plug to IE4 connector.
9. Driller attaches the T2P to the MDHDS using the quick connect.
10. Take off the response chamber, lower tip into casing; record this time.
11. Lower probe on wire line with slow fluid circulation (need to get stroke rate and wireline feed rate!)
12. Reference pressure reading at 500 meters water, stop circulation and hold the tool there for 30 seconds record time; (are we sure the pressure is Zero at the top of the drill string?)
13. Reference pressure reading at 1000 meters of water, stop circulation and hold the tool there for 30 seconds record time.
14. Reference pressure reading at mudline, stop circulation and hold the tool there for 30 seconds record time.
15. Lower probe to the bottom of drill string and land on the BHA.
16. Inject T2P into formation.
17. Leave the probe there for 30 minutes (time to be decided on the spot).
18. Wireline is raised, extracting probe from formation.
19. Remove from the quick connect, clean the tip and attach the response chamber once the tool is out of casing.
20. Have the drillers loosen the connections.
21. Pressure response check.
22. Download the previous stability data file and the current deployment data file.
23. Switch back to DC power; record time on battery log.
24. Start the next stability file (see file name convention).

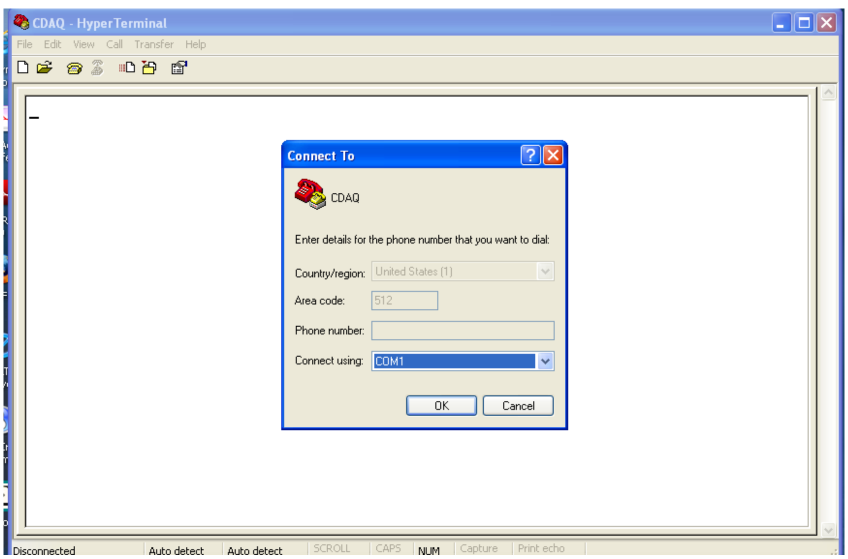
EXAMPLE OF LOGGING SESSION

The following set of steps is presented to provide a complete walkthrough of the data acquisition process..

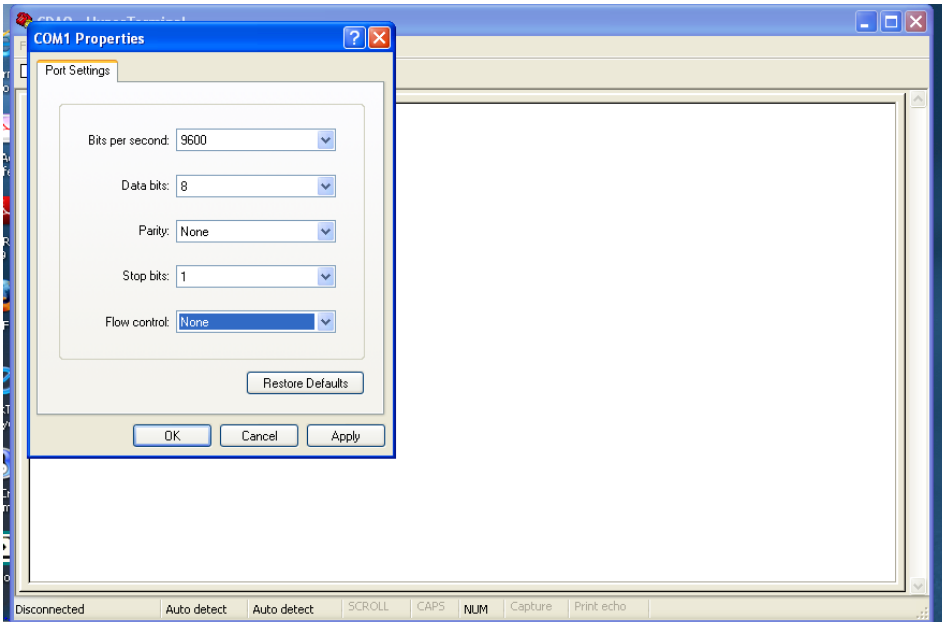
1. Connect CDAQ to computer with serial data cable. Open HyperTerminal from Start→All Programs→Communications→HyperTerminal. Then provide a name for the connection or use an existing connection.



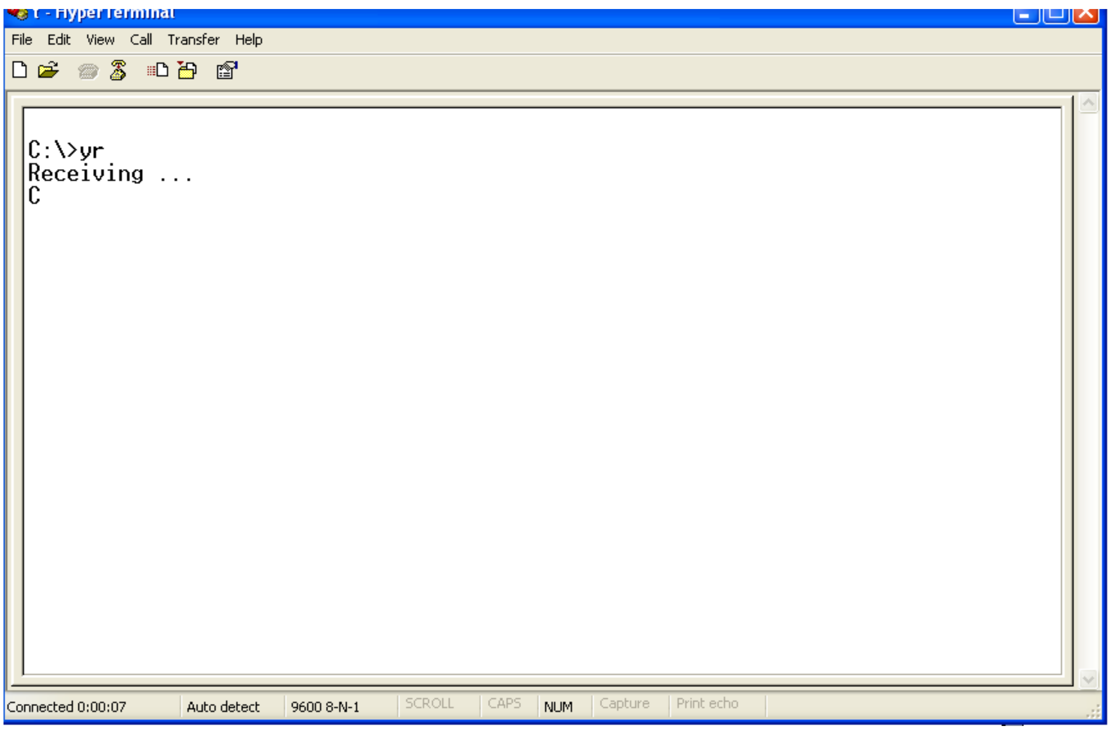
2. Select the port on the computer your CDAQ is attached to. This is typically COM1 by default, but may be different, especially if a serial to USB converter is being used.



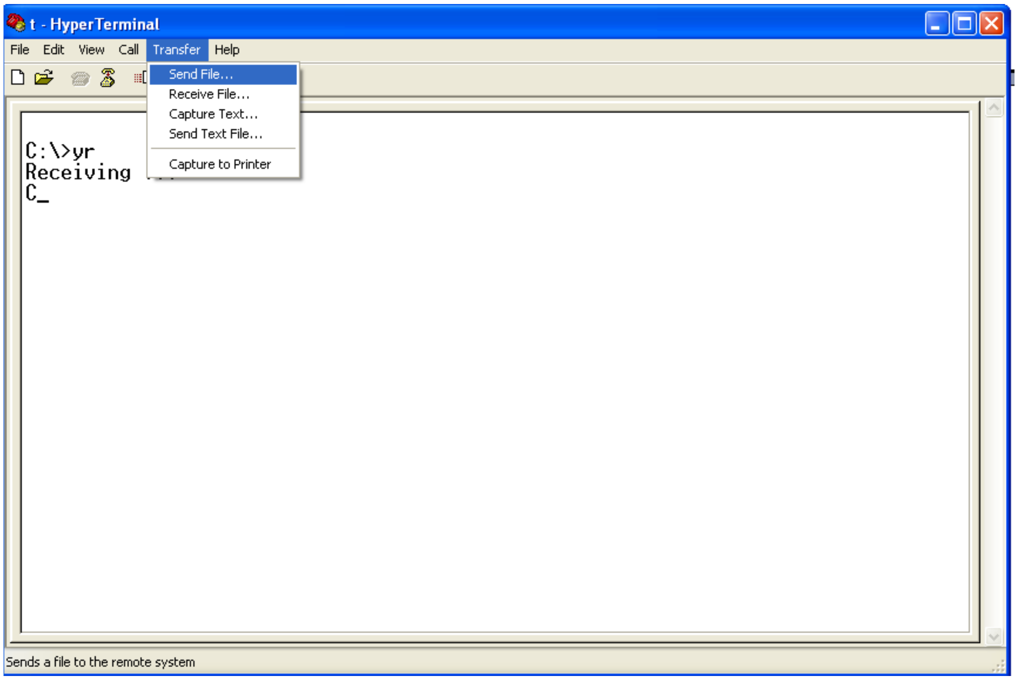
3. Apply the following connection settings:



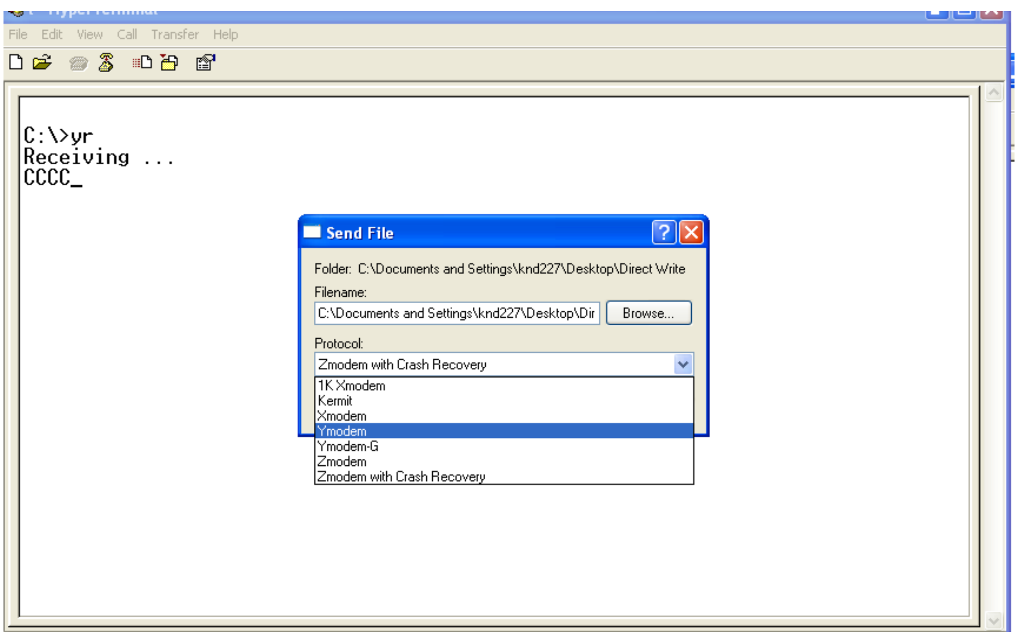
4. Persistor is operational when hitting [ENTER] returns the C:\> prompt.
To upload logging program type <yr> to receive file on Persistor. Otherwise, proceed to step 7.



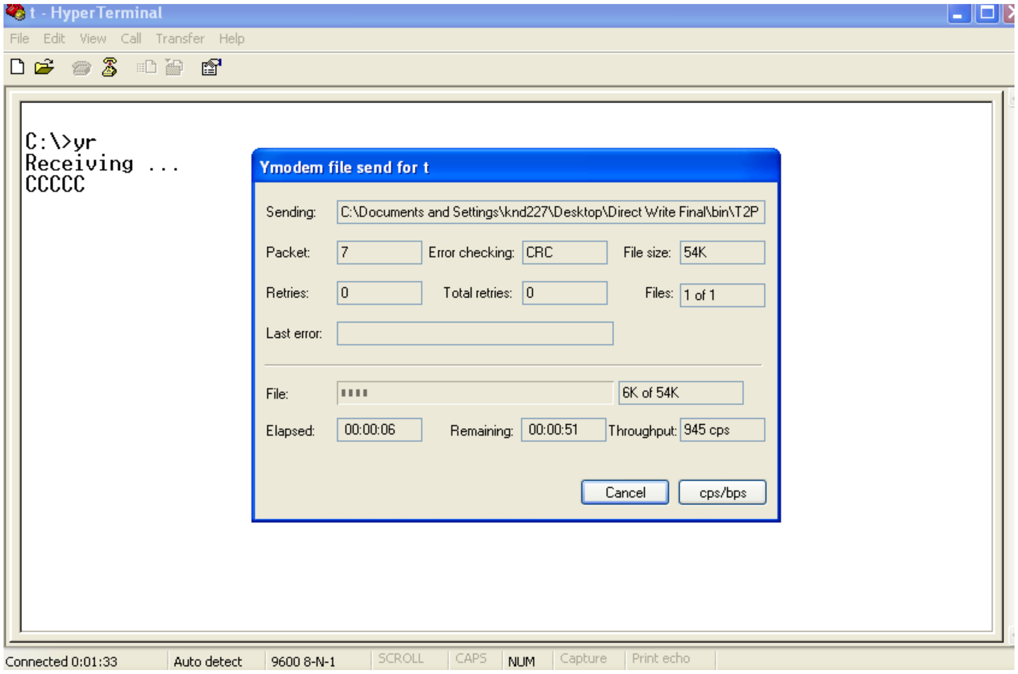
5. The file is ready to be received, but still requires action from the user. Once the transaction has started, click on the transfer toolbar, and then Send File from the pull down menu.



6. Browse to the desired destination for the executable and select “Ymodem” as the receiving protocol.

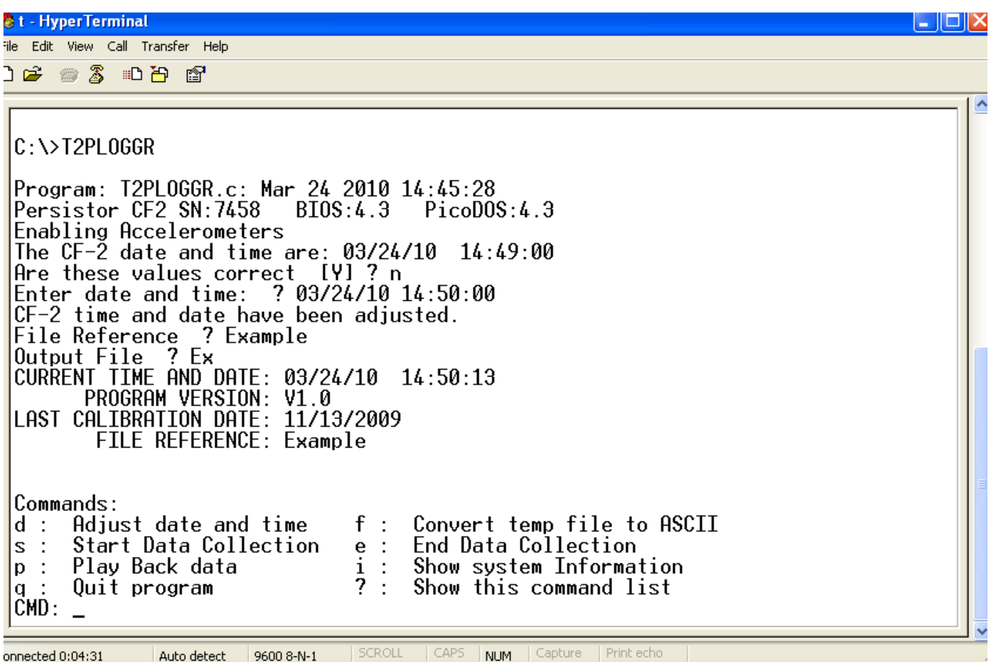


6. A dialog will pop up displaying the progress of the transaction.

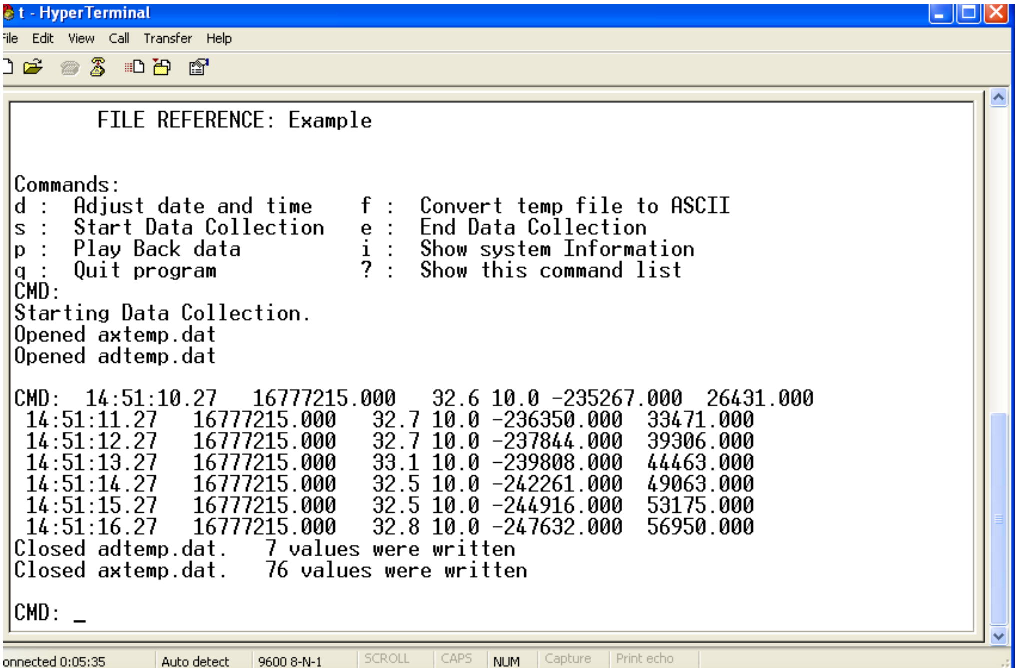


7. The program for logging data is then entered <T2PLOGGR> and the program is initiated.
   Type <N> if a new time must be established. Type the new time and date in this form: <mm/dd/yy> [SPACE] <HH:MM:SS>
   Type a File Reference of your choosing. This file reference will be displayed on the output file, and may be used for determining the contents of a file or specifying a description of the subsequent file.
   Type an output file name of your choosing (limit to 7 characters).

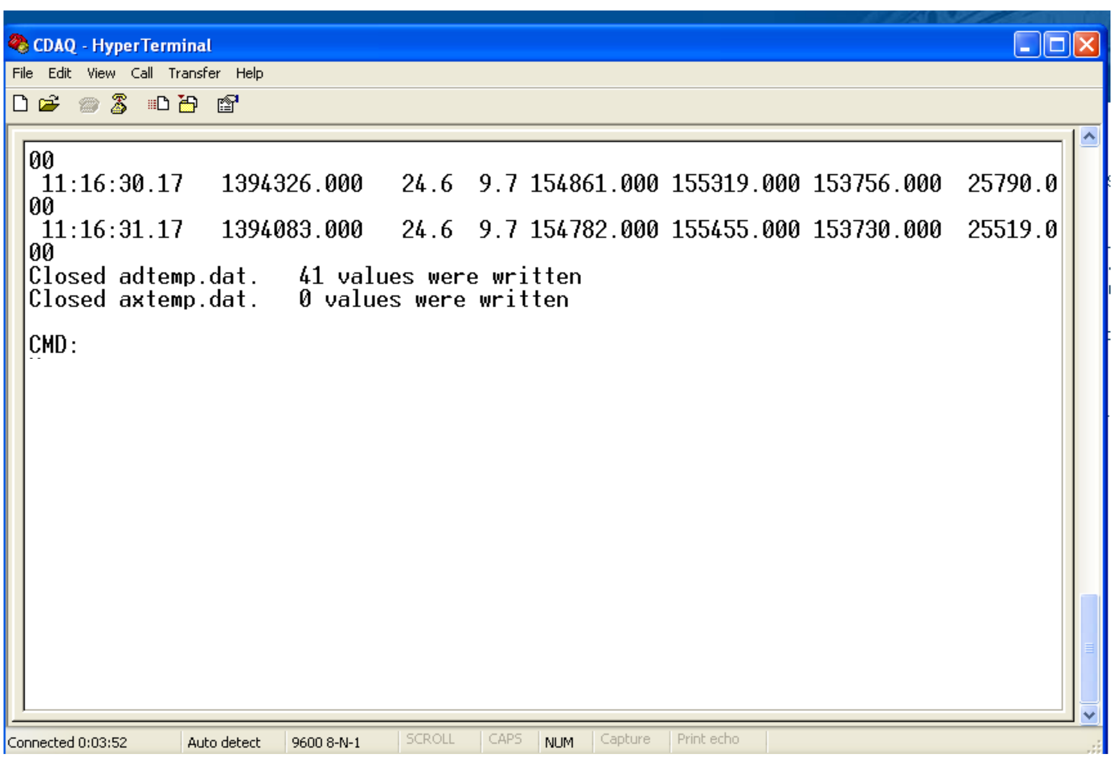
** Warning: If you make a mistake, hit [BACKSPACE]. Use of the arrow key, will crash T2PLOGGR.run and return user to PICO-DOS. If T2PLOGGR.run crashes, simply restart it. **



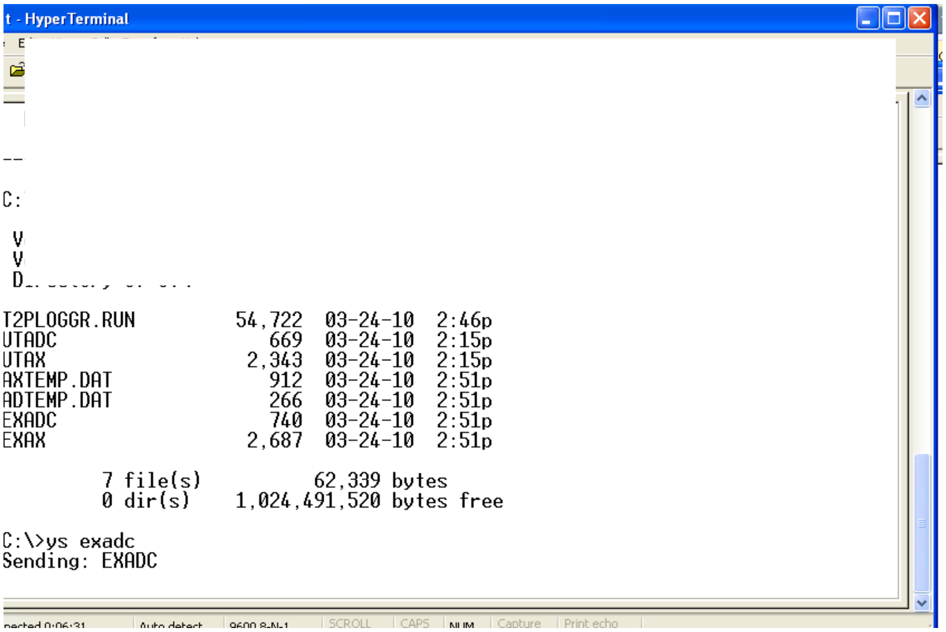
8. The <S> command starts data logging.
The column headers are removed, but will appear in the data file.
Once logging starts two files are created of the name given with suffixes x and d.
The x file contains accelerometer data and the d file contains all else.



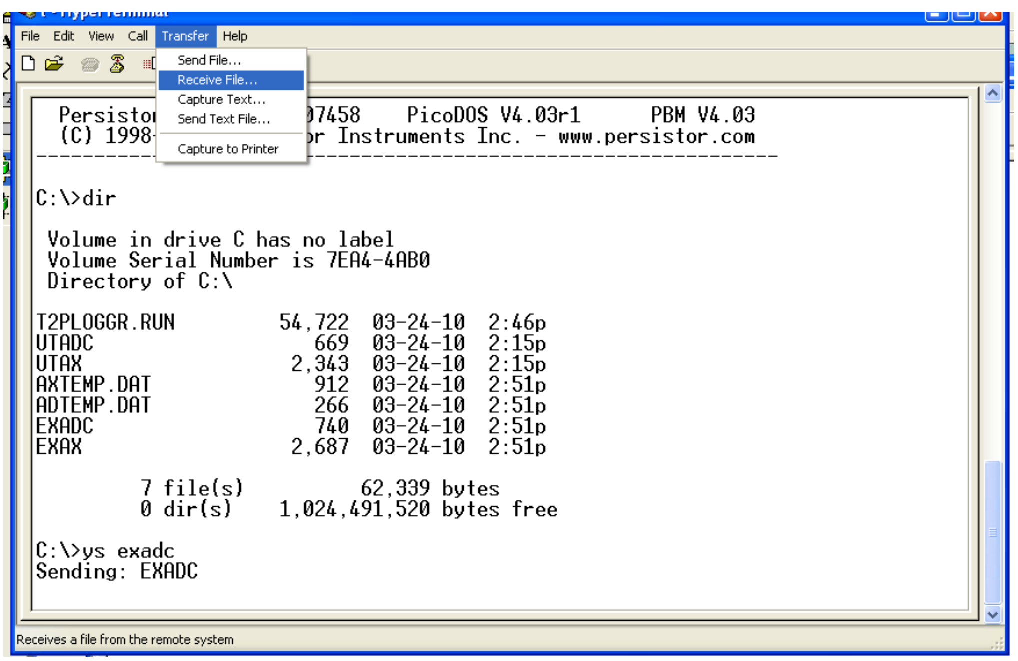
9. The <E> command will end the logging session.



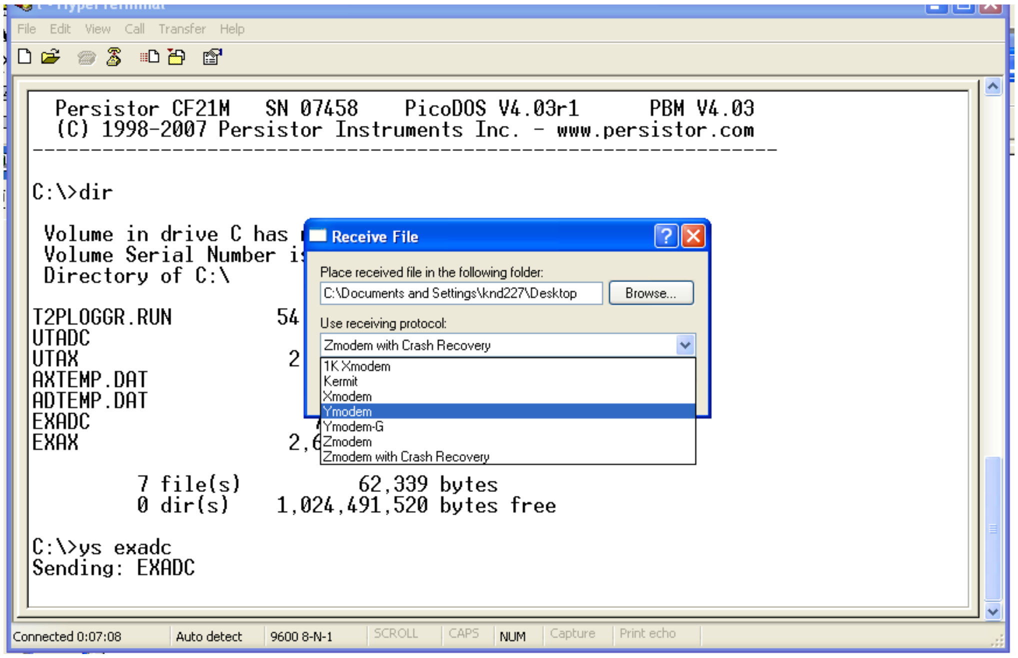
10. A <Q> command will quit the logging program and return to the Persistor main screen.
From this point, the logging program can be restarted or the created files can be sent to the host computer.
To re-run T2PLOGGR, proceed to step 4.
To display all the files on the disk type <DIR>
To send the created file, type <YS> [SPACE]<Name of File>



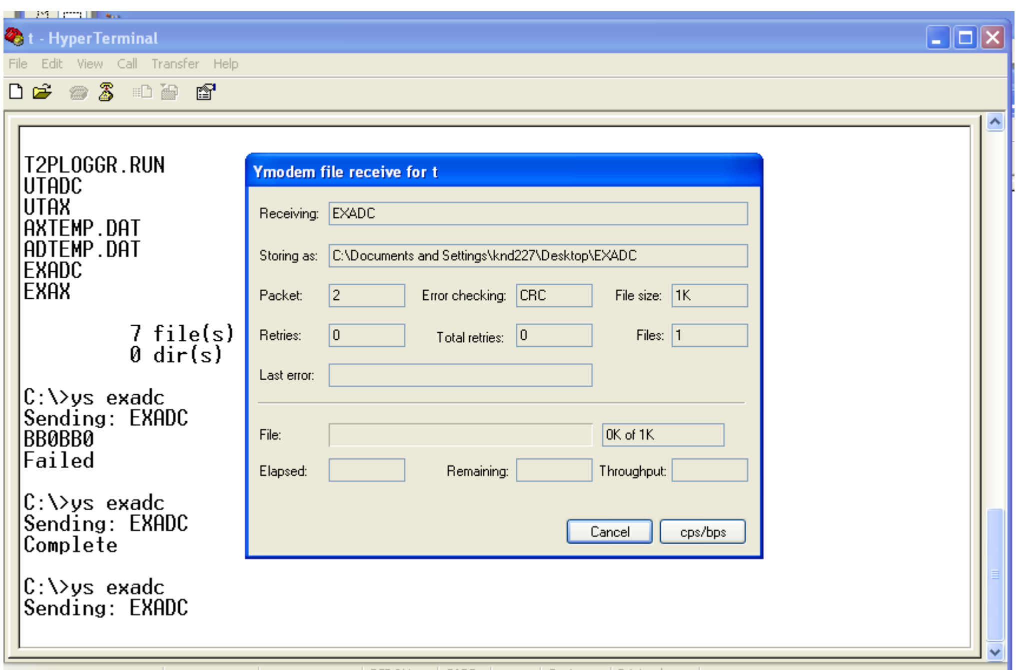
11. The file is ready to be sent, but still requires action from the user. Once the transaction has started, click on the transfer toolbar, and then Receive File from the pull down menu.



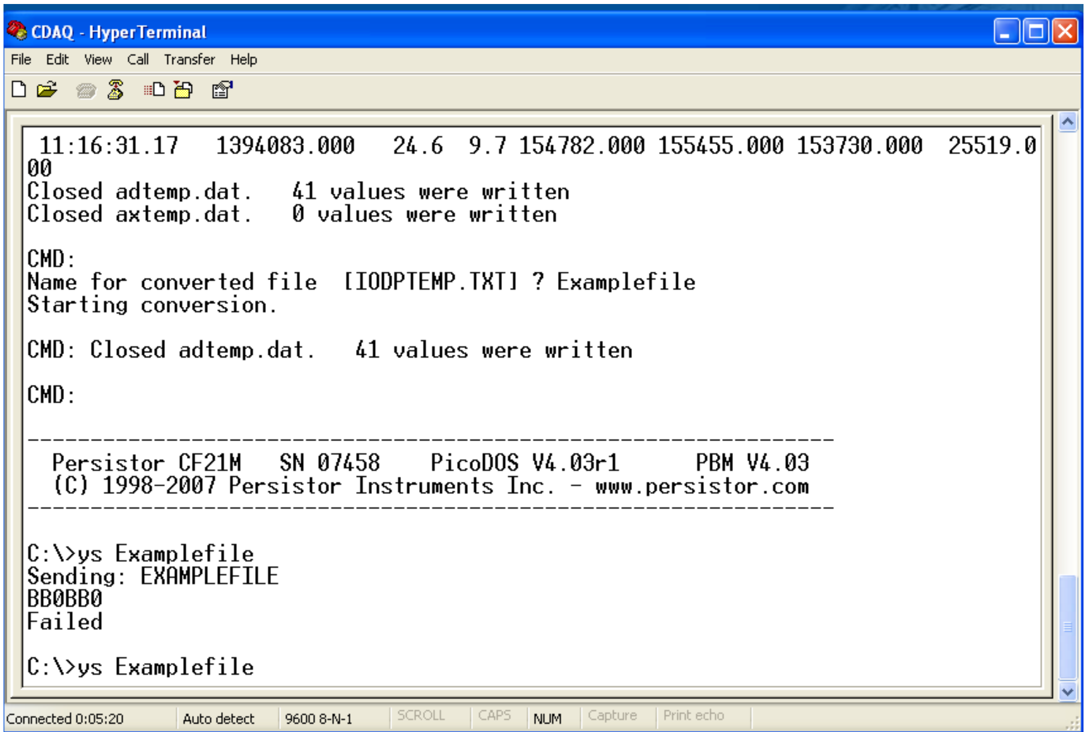
12. Browse to the desired destination for the sent file and select “Ymodem” as the receiving protocol.



13. A dialog will pop up displaying the progress of the transaction.



14. If the entire clicking process is not completed during the allotted time window, the transaction will cease and a ”Failed” message will be displayed. Please return to step 9 and perform the process quicker.



3.3. TOOL BOX:

Toolbox Packing List		
Top Shelf		
Hammer		
Measuring tape		
Flashlight		
Electrical kit		
Stopwatch		
String		
Top Drawer		
Scissors		
X-acto knife		
Utility knife		
Slip-joint pliers		
Needle nose pliers	large	
Needle nose pliers	small	
Diagonal cutters	large	
Diagonal cutters	small	
Flat nose pliers		
Middle Drawer		
3/16 flat screwdriver		
1/8 flat screwdriver		
#1 Phillips screwdriver		
1/4" nutdriver		
Allen wrench set		
GT insertion tool		
GT extraction tool		
stopper tool		
Bottom Drawer		
8" crescent wrench		
SAE wrench set		
Metric wrench set		
Needle spanner wrench		
Needle shaft wrench		
2 1/2" spanner wrench (2)		
IE4 fishing neck wrench		

3.4. T2P LOG SHEET FOR PROBE 1:

1. transducer A (tip):
2. transducer B (shaft):
3. thermistor:
4. CDAQ S/N:

Log sheet:

Date & Time	Event	File name	Comments

T2P LOG SHEET FOR PROBE 2:

1. transducer A (tip):
2. transducer B (shaft):
3. thermistor:
4. CDAQ S/N:

Log sheet:

Date & Time	Event	File name	Comments

3.5. T2P DEPLOYMENT DATA SHEET:

Hole:
Water depth:
Probe:
Filename:
Date:

Penetration rate:
Penetration distance:
Circulation rate:

Operations	Time/depth	comments
Get the depth after APC coring		
Switch DC power to battery	DC power off: Battery on:	
Start Logging		File name
Pressure response to make sure both transducers works		
Rig up probe/CDS		
Remove the chamber, lower tip into the casing		
Reference pressure reading at 500 meters		Stop circulation, hold the tool there for 30 seconds
Reference pressure reading at 1000 meters		Stop circulation, hold the tool there for 30 seconds
Reference pressure reading at mudline (meters)		Stop circulation, hold the tool there for 30 seconds
Tool at bottom of Borehole (locked in BHA)		Get the depth from driller
Start to retract MDHDS Start to penetrate formation (add lines for 10 cm drill string movement)		Specify the penetration displacement and penetration rate
End of push		
Start to pullout		
Tool out of casing and put on the chamber		
Clean up the probe		
Pressure response		

test		
Download data		The previous stability data file & the deployment data
Switch back to DC power	Battery off: DC power on:	
Start the next stability file (2 minutes interval)		

3.6. SHIP LOGGING DATA

Get the ship's logging data from ship database. Get wireline data from wireline operator.

3.7. DATA MANAGEMENT

7.1 File name convention for in-situ measurement
T2P_1, 2, 3…

7.2 File name convention for stability data
Probe 1: stab_1a, 1b, 1c….
Probe 2: stab_2a, 2b, 2c …

7.3 File name convention for ship logging data
T2P_1, 2, 3…_ship

APPENDICES

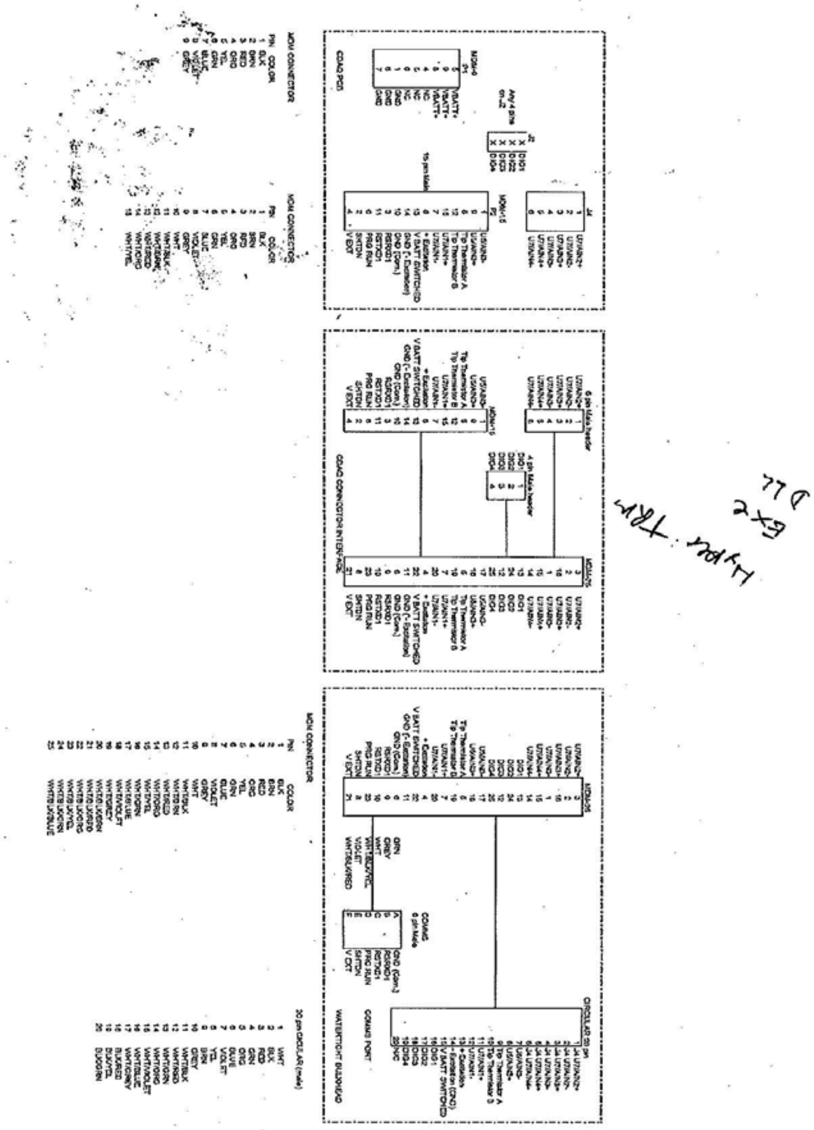
I. PARTS LIST

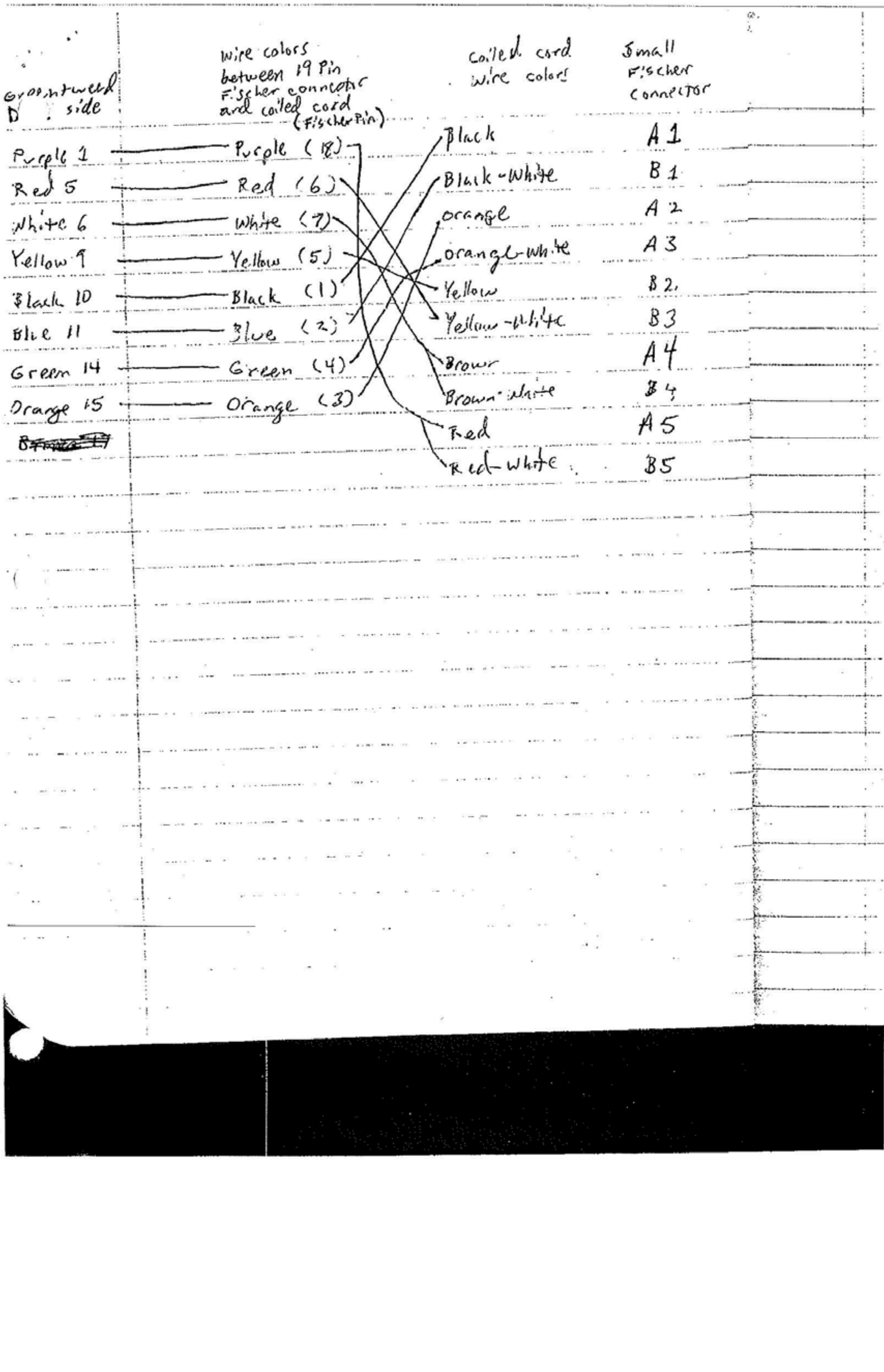
Part Name	Length	Diameter	Material
Complete Tip Assembly			
Threaded Tip Insert	1.35"	0.23"	Stainless Steel
Small Porous Ring	0.20"	0.24"	Sintered SS
Thin Wiring Tube	11"	.06"	Stainless Steel
Tip Thermistor			Misc.
Needle			Stainless Steel
old			
new	8.375"	0.24” to 1.42"	
Large Porous Ring	0.2"	1.42"	Sintered SS
Transducer Block	3.2"	1.42"	Stainless w/copper coated threads
Threaded Hex Standoff	1.875"	0.25"	Steel
Pressure Transducer	1.75"	.375"	Stainless Housing
Body			
Drive Tube	42.75"	1.43"	Stainless Steel
Drive Tube Backing Plate	30"	0.86"	Aluminum
Backing Plate Tip Bracket	0.5"	0.93"	Aluminum
Backing Plate Aft Bracket	0.5"	0.93"	Aluminum
5 Pin Fischer Connector	1.41"	0.349	Brass, etc.
plug			
receptacle			
Drive Shaft Wiring Harness (curly cable)	6"	N/A	Misc.
Fischer Retainer	1.1"	1.1"	4140 Steel
Drive Tube Nut	2.75"	2.0"	4140 Steel
Spin Collar	8.5"	2.75"	Steel
Drive Tube Threaded Union	9.5"	2.75"	Steel
Fischer Washer	0.2"	1.36"	?
Fischer Receptacle (19 pin)	1.06"	0.58"	Misc.
Greene Tweed (GT) push in tube	1.2"	0.74"	Steel
GT Pass-through	1.56"	0.75"	Misc.
GT Strain Relief	1.2"	0.75"	Steel
Wire harness from GT Pass through to CDAQ	~10"	N/A	Misc.

CDAQ Housing	30"	2.75"	Stainless Steel
1/2 round spacer	1.7"		Aluminum
threaded rod-T/U to CDAQ	8-32	2.5"	
15 Pin MDM Bracket	0.25"	2.5"	Aluminum
CDAQ mdm bulkhead			Aluminum
#8 nylon spacers	1/2"		nylon
CDAQ			
CDAQ Mount			cast Al
CDAQ clamshell			Fiberglass?
CDAQ clamshell spacers	1/2"		Aluminum
Electronics cover	12.5"		Delrin
Small electronics cover	2.6"		Delrin (2 pcs ea.)
Wiring harness to endcap-MKS			
Wiring harness to endcap-IE4			Misc.
battery compression plug			Delrin + SS spring
Endcap			Stainless Steel
Endcap conn plate-IE4			Stainless Steel
IE4M dummy plug			
IE4 retaining nut (male)			
3 pin Fischer connector			
plug			
receptacle			
Batteries	Serial #	Date	
	HH038	5/30/2002	
	HK032	5/26/2005	
	HQ001	1/20/2010	
	HQ002	1/20/2010	
	HQ004	11/19/2010	
	HQ005	11/19/2010	
	HR001	6/20/2011	
	HR002	6/20/2011	

O-Rings (Size)	Material	Hardness	ID	OD	Width
Probe Needle Tip (inside) (206)	Buna		1/2	3/4	1/8
Transducer Block					
Small (003)	Buna	70	1/16	3/16	1/16
Medium (014)	Buna	70	1/2	5/8	1/16
Large (214)	Buna	90	1	1 1/4	1/8
Transducer (006)	Buna	70	1/8	1/4	1/16
Drive Tube Nut					
Inner (218)	Buna	70	1 1/4	1 1/2	1/8
Outer (224)	Buna	70	1 3/4	2	1/8
GT Pass-through (016)	Buna	90	5/8	3/4	1/16
Threaded Union (224)	Buna	90	1 3/4	2	1/8
Endcap (224)	Buna	90	1 3/4	2	1/8
Endcap conn plate (118)	Buna	70	7/8	1 1/16	3/32

II. CDAQ & T2P WIRING SCHEMATICS



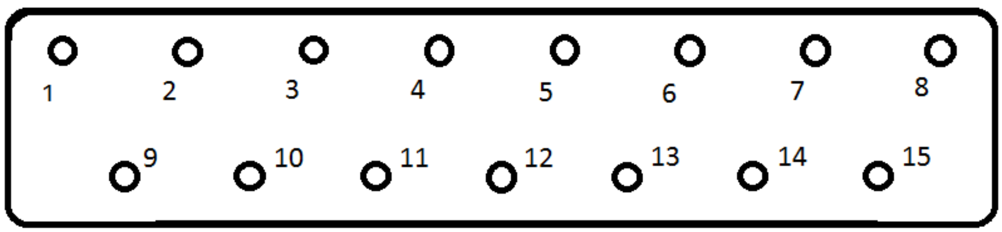

Grommeted D side
Wire colors between 19 Pin Fischer connector and coiled cord (Fischer Pin)
Coiled cord wire colors
Small Fischer Connector
Purple 1
Red 5
White 6
Yellow 9
Black 10
Blue 11
Green 14
Orange 15
Purple (18)
Red (6)
White (7)
Yellow (5)
Black (1)
Blue (2)
Green (4)
Orange (3)
Black
Black-White
Orange
Orange-White
Yellow
Yellow-White
Brown
Brown-White
Red
Red-White
A 1
B 1
A 2
A 3
B 2
B 3
A 4
B 4
A 5
B 5

	Wire colors between 19-Pin Fischer connector And coiled cord		Coiled cord wire colors
1	Black	~~Thermistor 1~~	Black
2	Blue	Thermistor 2	Black-white
3	Orange	Pressure 1 +	Orange
4	Green	Pressure 1 −	Orange-white
5	Yellow	Pressure 2 +	Yellow
6	Red	Pressure 2 −	Yellow-white
7	white	Excitation +	Brown
18	Purple	Excitation −	Brown white
			Red
			Red white

coiled cord wire colors	Transducers
Black	
Black white	
Orange	
Orange-white	
Yellow	
Yellow-white	
Brown	
Brown White	
Red	
Red white	

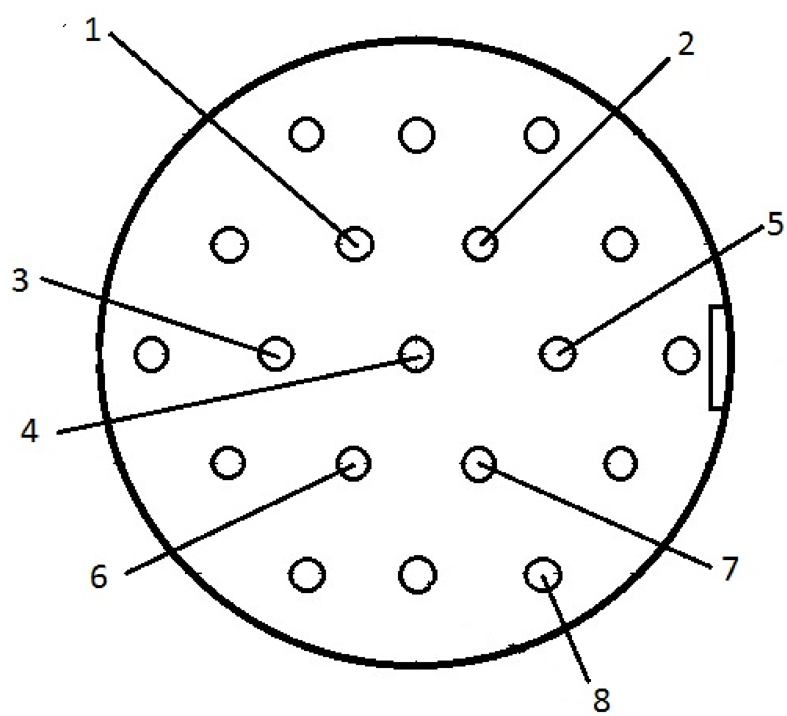
Greene Tweed wiring assembly

15 pin mdm connector
Back side



1 Pressure 2^{+} -black   5 Tip thermistor 1 -yellow   7 Pressure 1^{-} -blue
8 Excitation^{+} -violet   9 Pressure 2^{-} -grey   12 Tip thermistor 2 -wht/brn
14 Excitation^{-} -wht/org   15 Pressure 1^{+} -wht/yel

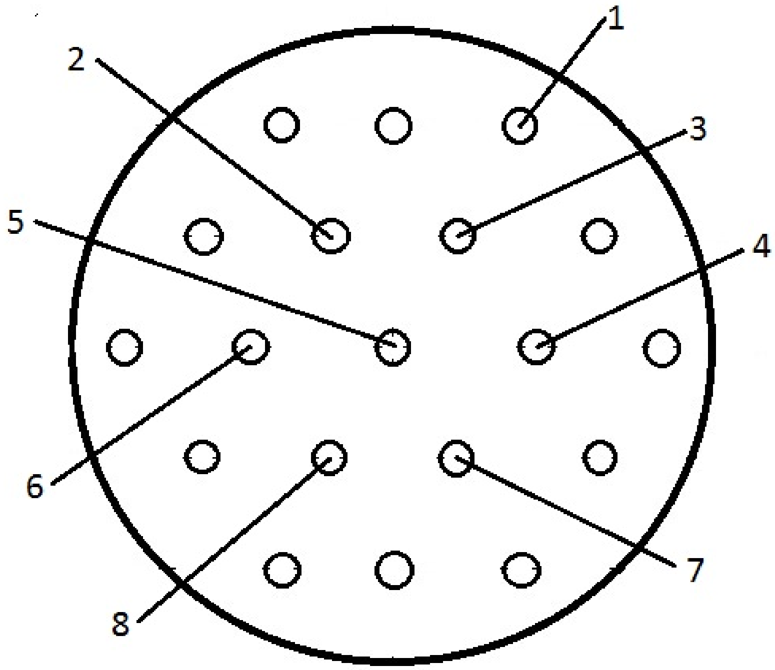
Greene Tweed pass-through
CDAQ side



1 Pressure 2^{-} -grey   2 Pressure 2^{+} -black   3 Thermistor 2 –wht/brn
4 Tip thermistor 1 –yellow   5 Pressure 1^{+} -wht/yel   6 Excitation^{+} -violet
7 Pressure 1^{-} -blue   8 Excitation^{-} -wht/org

Greene Tweed pass-through

Tip side



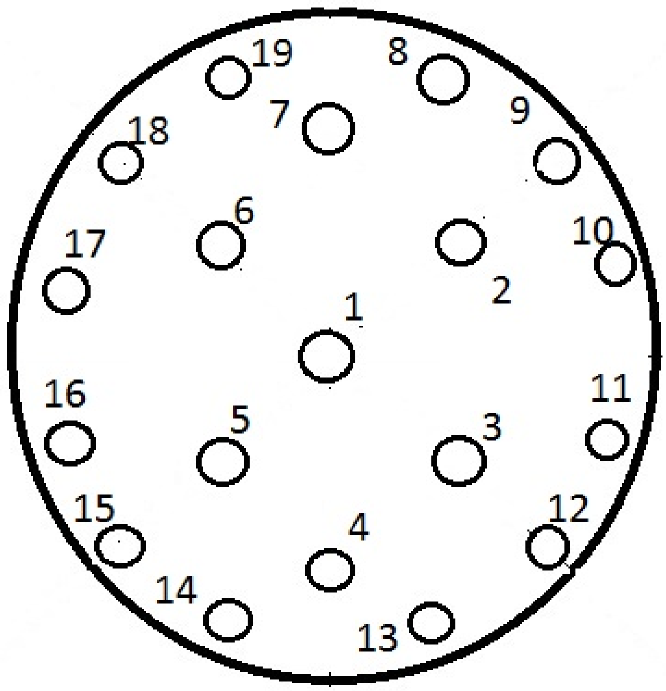
1 Excitation$^-$ -wht/org 2 Excitation$^+$ -violet 3 Pressure 1$^-$ -blue

4 Pressure 1$^+$ -wht/yel 5 Tip thermistor 1 –yellow 6 Tip thermistor 2-wht/brn

7 Pressure 2$^+$ -black 8 Pressure 2$^-$ -grey

19 pin Fischer receptacle

Back side



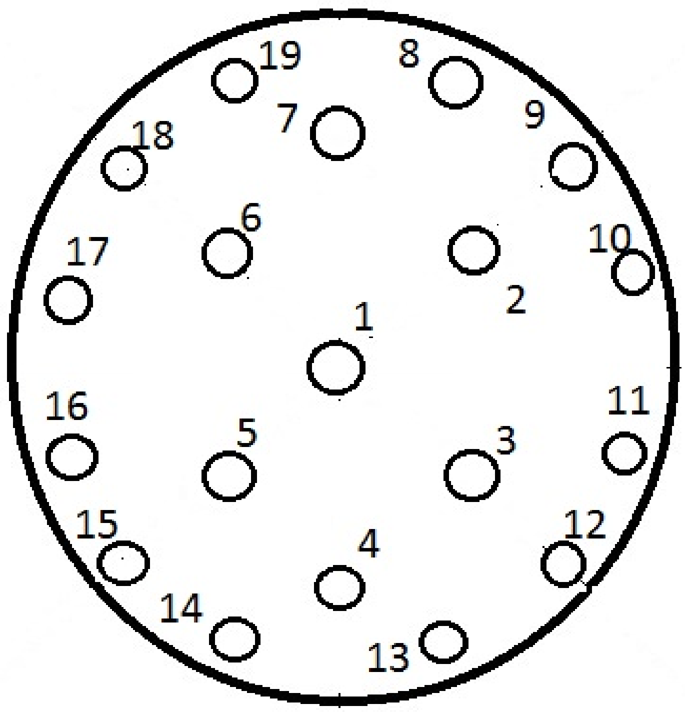
1 Tip thermistor 1 –yellow 2 Tip thermistor 2 –wht/brn 3 Pressure 2^- -grey

4 Pressure 2^+ -black 5 Pressure 1^+ -wht/yel 6 Pressure 1^- -blue

7 $Excitation^+$ -violet 18 $Excitation^-$ -wht/org

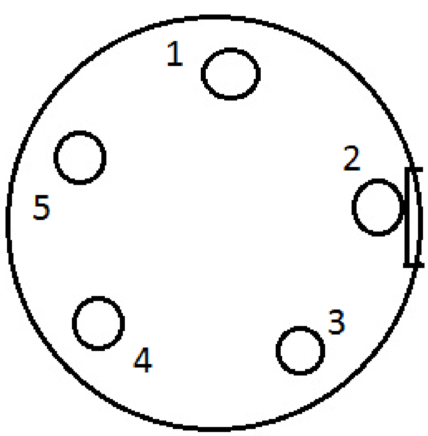
Drive tube wiring cable (curly)

19 pin Fischer plug



1 Tip thermistor 1 –yellow 2 Tip thermistor 2 –wht/brn 3 Pressure 2^- -grey
4 Pressure 2^+ -black 5 Pressure 1^+ -wht/yel 6 Pressure 1^- -blue
7 Excitation$^+$ -violet 18 Excitation$^-$ -wht/org

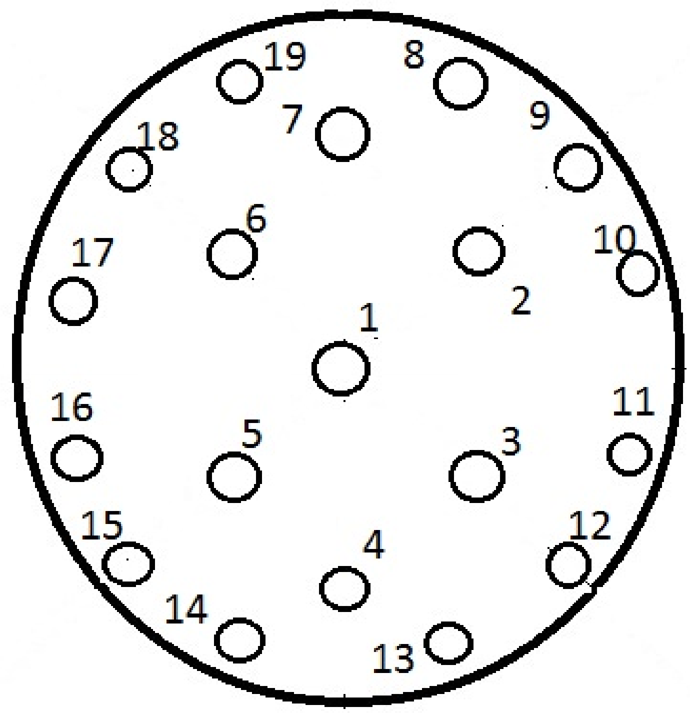
5 pin Fischer receptacle



1 Excitation$^-$ -black 2 Thermistor –white 3 Pressure$^+$ -green 4 Pressure$^-$ -white
5 Excitation$^+$ -red

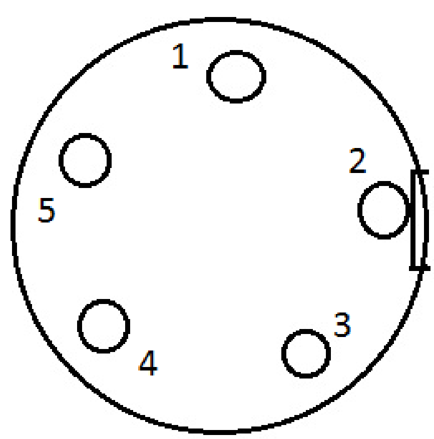
Drive tube wiring cable (straight)

19 pin Fischer plug



1 Tip thermistor 1 –grn/blk 2 Tip thermistor 2 –green 3 Pressure 2^- -white
4 Pressure 2^+ -red 5 Pressure 1^+ -wht/blk 6 Pressure 1^- -red/blk
7 Excitation$^+$ -blue+black 18 Excitation$^-$ -org+org/blk

5 pin Fischer receptacle

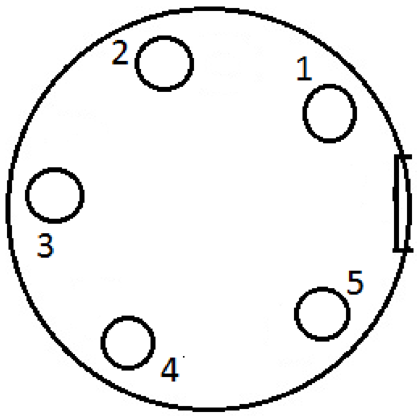


1 Excitation$^-$ -org or org/blk 2 Thermistor –grn or grn/blk 3 Pressure$^+$ -red or wht/blk
4 Pressure$^-$ -white or red/blk 5 Excitation$^+$ -blue or blk

Pressure transducer

5 pin Fischer plug

Back side

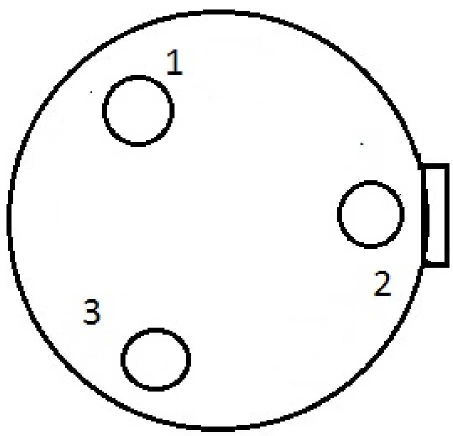


1 Excitation+ -red 2 Excitation- -black 3 Thermistor –white 4 Pressure+ -green 5 Pressure- -white

CDAQ

3 pin Fischer receptacle

Back side

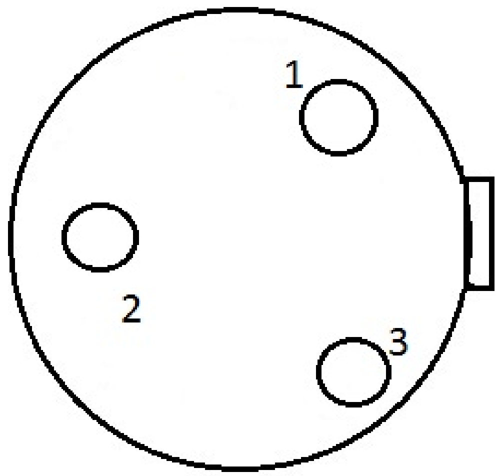


1 Ground –green 2 Receive –orange 3 Transmit –red

End Cap Connector Plate

3 pin Fischer plug

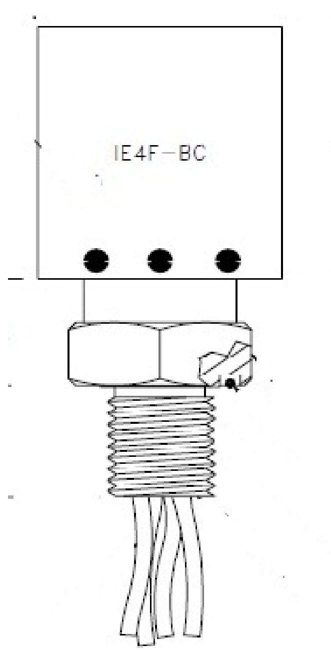
Back side

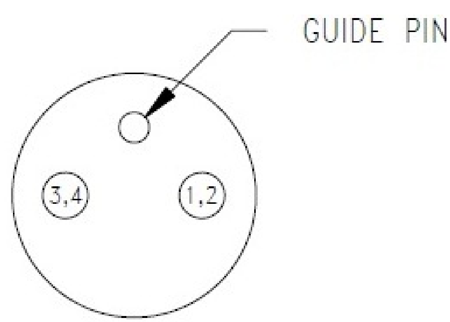


1 Ground –green   2 Receive –orange   3 Transmit –red

IE4F connector

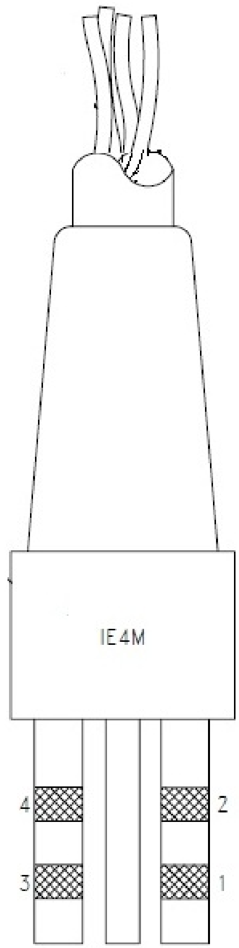
Back side wires



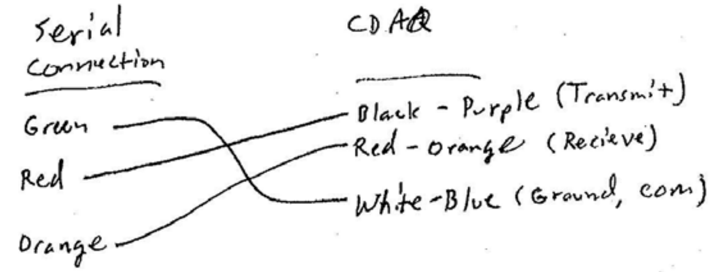


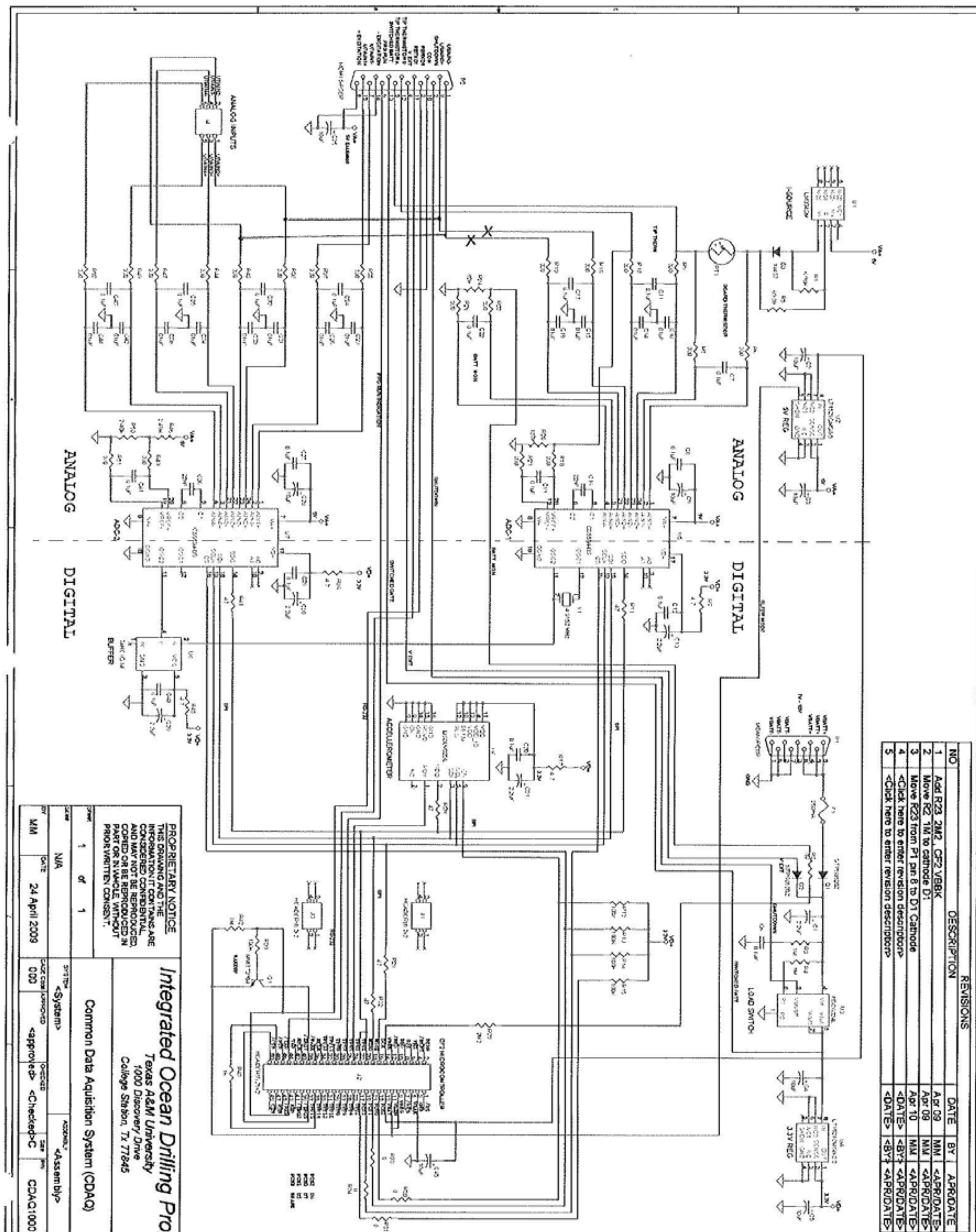
Black (1) –to red (TX) from Fischer plug   White (2)–to orange (RX) from Fischer plug
Red (4) – to green (GND) from Fischer plug

IE4 Data Cable



Black (1) –to orange (TX) from serial (pin 2)   White (2)–to red (RX) from serial (pin 3)
Red (4) – to green (GND) from serial (pin5)


Serial Connection
CDAQ
Green
Red
Orange
Black - Purple (Transmit)
Red - Orange (Recieve)
White-Blue (Ground, com)



ANALOG
DIGITAL
ANALOG
DIGITAL
ANALOG INPUTS
ACCELEROMETER
BUFFER
LOAD SWITCH
5V REG
3.3V REG
REVISIONS
NO | DESCRIPTION | DATE | BY | APR/DATE
1 | Add R23 2M2, CF2 VBBK | Apr 09 | MM | <APR/DATE>
2 | Move R2 1M to cathode D1 | Apr 09 | MM | <APR/DATE>
3 | Move R23 from P1 pin 8 to D1 Cathode | Apr 10 | MM | <APR/DATE>
4 | <Click here to enter revision descriptor> | <DATE> | <BY> | <APR/DATE>
5 | <Click here to enter revision descriptor> | <DATE> | <BY> | <APR/DATE>
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Integrated Ocean Drilling Program
Texas A&M University
1000 Discovery Drive
College Station, Tx 77845
Common Data Aquisition System (CDAQ)
<System>
<Assembly>
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24 April 2009
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