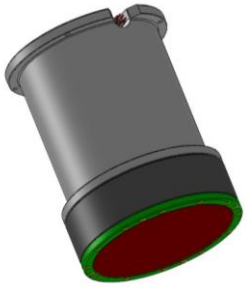
RTI ADCP/DVL

Troubleshooting GUIDE



ROWE TECHNOLOGIES

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Date	Rev	Name	Notes
08/01/2012	A	Rico	Initial
10/15/2014	B	Rico	Added No serial Comm and I2C error.

1. ADCP Underwater Cable Connections

This cable is used for communication between the ADCP and computer. The standard underwater cable will have a RS-232 connection and a RS-485 USB connection for communication to a computer. It will have a power connection to connect to a power brick included with the system. It will have an 8 pin female underwater connection with threaded cover to connect to the ADCP.

Figure 1: ADCP Underwater Cable

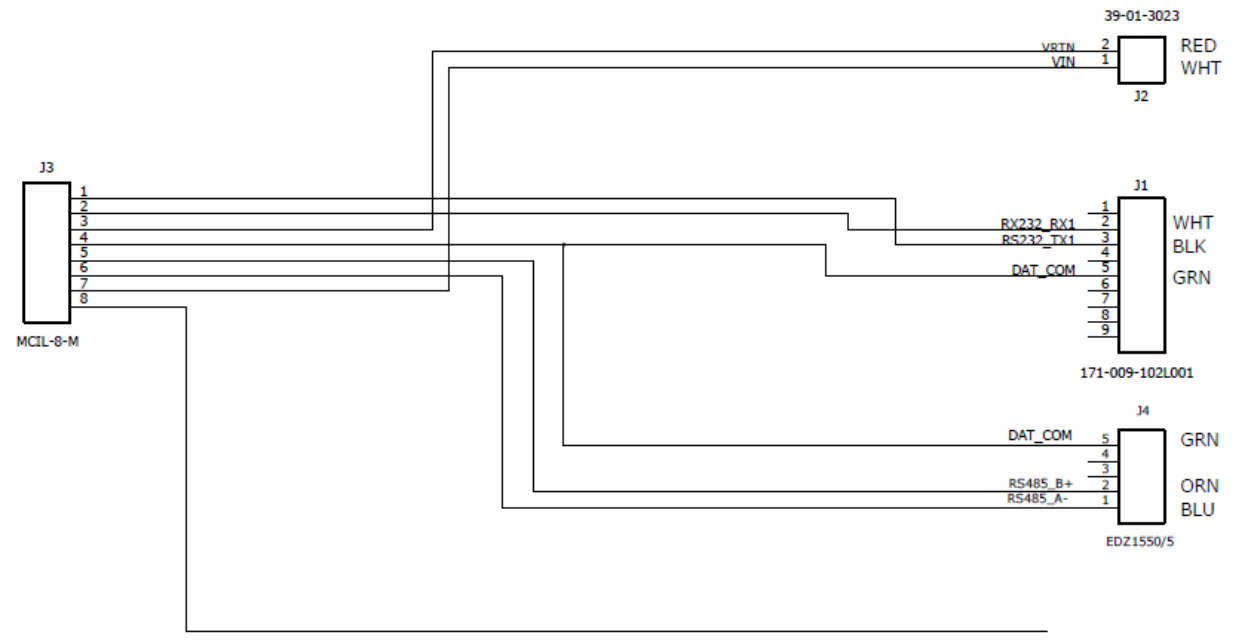


Figure 2: Underwater cable assembly

1.1. RS-485 Connection

The RS-485 has a green 5 pin male connecter. This connector will connect to the RS-485 to USB adapter. The USB adapter will then be connected to a computer. COM ports on a computer will vary when connected to the computer.

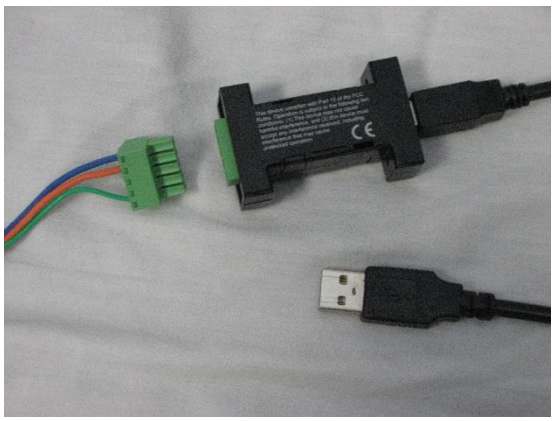


Figure 3: RS-485 Connection

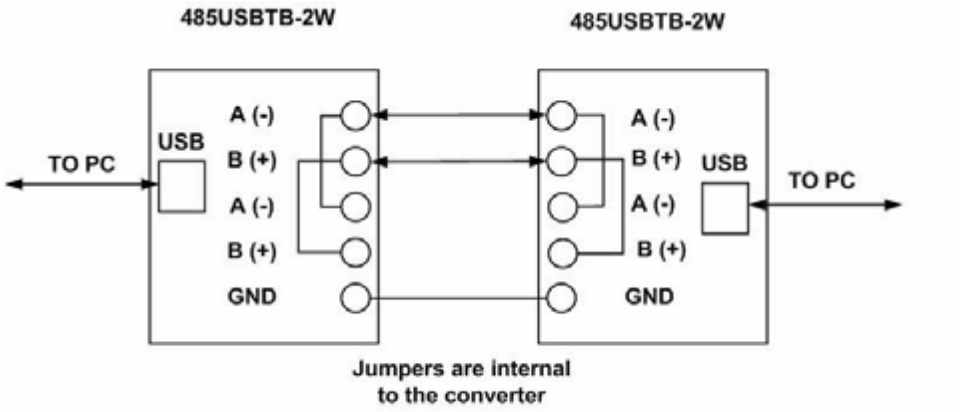


Figure 4: RS-485 back to back test

1.1.1. Troubleshoot RS-485 Connection

Due to the circuit configuration, a loopback test is not possible with this model of RS-485 converter. However, two converters can be used in a back to back configuration. Refer to the diagram above to make a back to back connection.

Using Pulse or another serial port application such as Putty, connect to the appropriate COM ports. Set the desired baud rate. Then transmit data. If the same string is received on the other side, the test is good.

Alternative Serial Port Application - Putty:
http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe

RS-485 Converter Datasheet - 485USBTB-2W:
http://www.bb-elec.com/bb-elec/literature/485USBTB-xW_4208ds.pdf

Detailed Loopback Instructions:
http://www.usconverters.com/downloads/rs485_portcheck_hyperterminal.pdf

1.2. RS-232 Connection

The RS-232 connection is the metal DB9 connector on the underwater cable. This cable is used to communicate with ADCP. It is also used to allow GPS data into the ADCP so that it can be recorded with an ensemble.

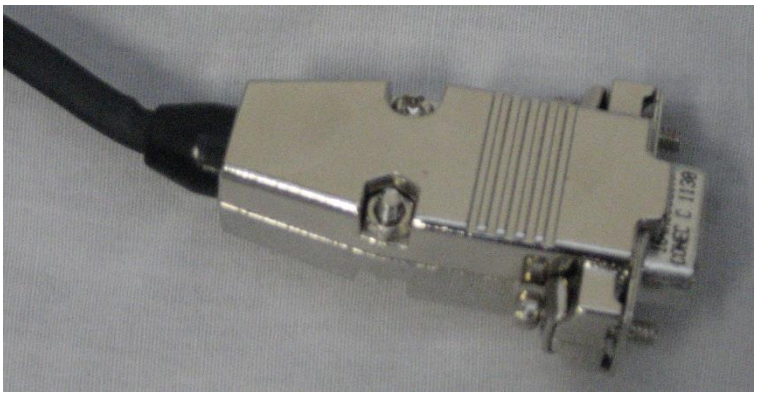


Figure 4: RS-232 Connector

Suggested RS-232 to USB Converter:
http://www.digikey.com/product-detail/en/US232R-10-BULK/768-1013-ND/1836391

1.2.1. Loopback Test

The RS-232 can be verified to work with a loop back test. Connect pins 1 and 2 of the underwater cable together and test in a serial port application that the data is echoed back. You can use Pulse or Putty to verify the loopback test is good.

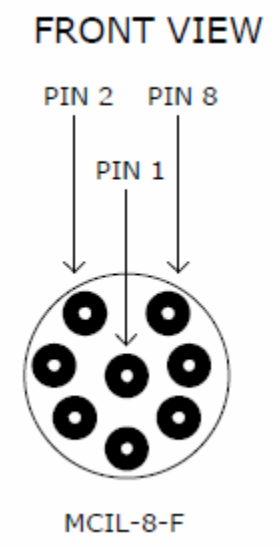


Figure 5: Underwater Cable Pinout

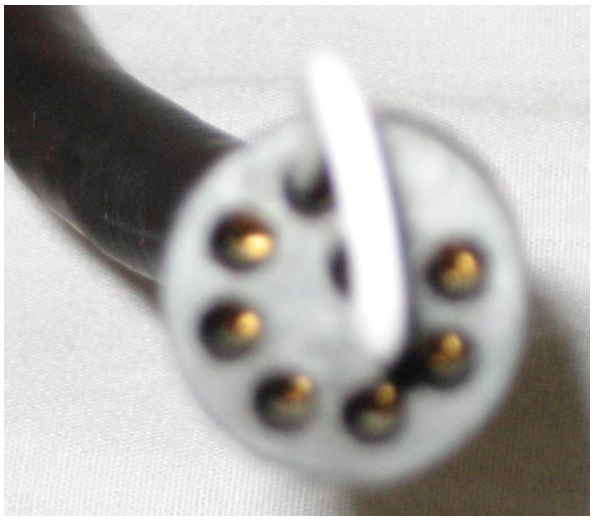


Figure 6: Underwater RS-232 Loopback Connection

1.3. Power Connection

The power connector is intended to be connected to a power brick supplied with the ADCP. The power brick will be connected to the underwater cable and a wall socket. This will power the system.

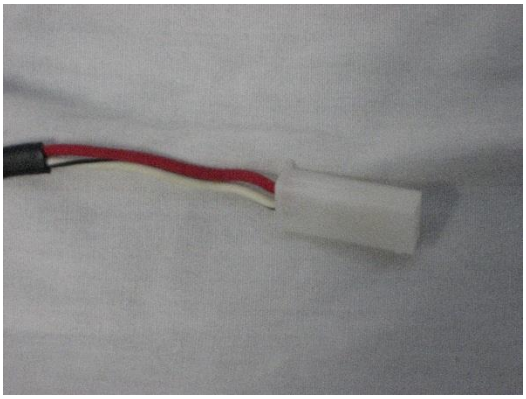


Figure 7: Underwater Cable Power Connection

1.3.1. Power Brick

The power brick should output 19v to the ADCP underwater cable. This can be verified by placing a multimeter on the two pins of the connector on the power brick.

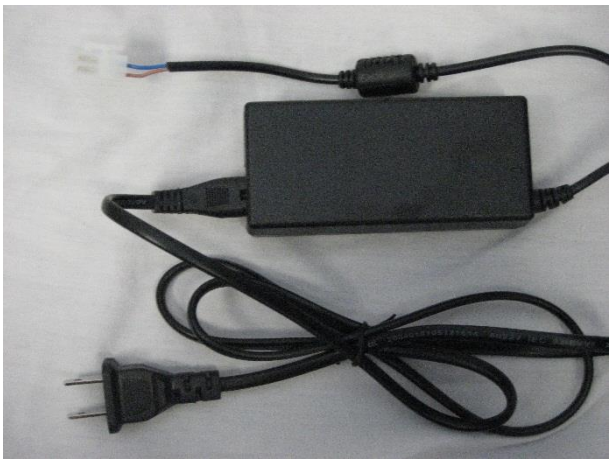


Figure 8: Power Brick

Then connect the power brick to the underwater cable and verify on the underwater connector that 19V is seen. This is pins 3(+) and 7(-) on the underwater connector.

Figure 9: Test Power on Underwater Connector

1.4. Underwater Connector

Connect the underwater connector to the ADCP housing. With the pin configuration, the underwater cable can only be connected it the ADCP housing in one orientation. Rotate the underwater connector until the pins line up. Then insert the connector into the ADCP housing connector. Then rotate the threaded cap to secure the connector onto the housing.

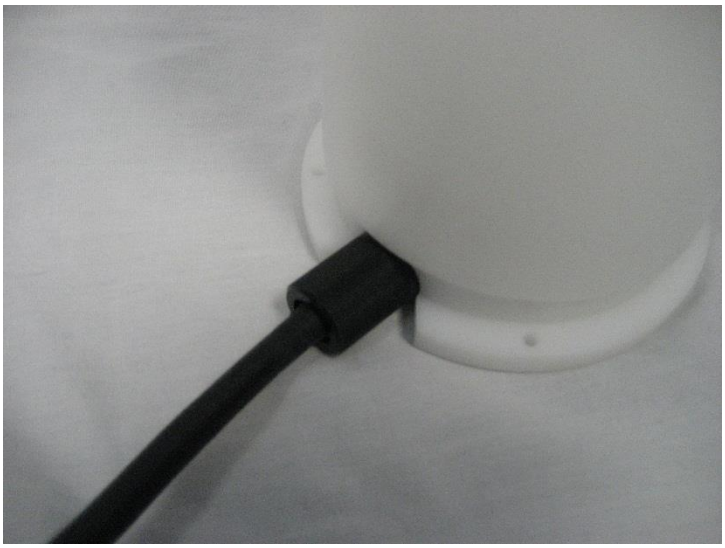


Figure 10: Underwater cable connected to housing

When power is applied to an ADCP with a plastic housing, a glowing LED should be seen within the housing. Verify the ADCP has a glowing LED seen within the housing. This is a clue that the board stack within the ADCP is functioning and has power.

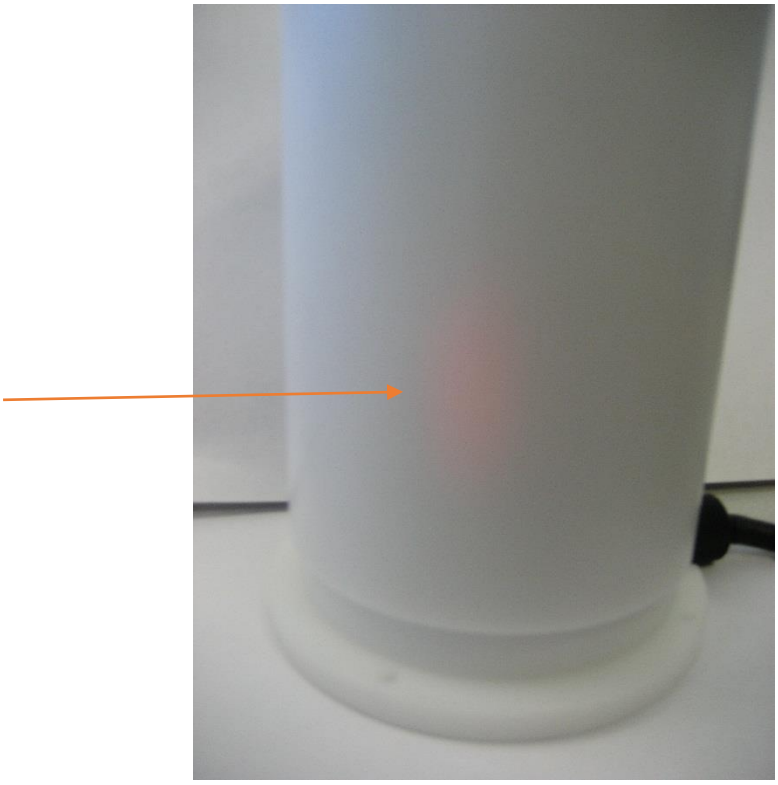


Figure 11: LED glow on the ADCP housing

2. Serial communication

Typical communication to the ADCP is through a serial communication. The user can use the RS-485 or RS-232 communication to the ADCP. The default settings for the serial ports are:

Baud rate: 115200
Data Bits: 8
Stop Bits: 1
Parity: None
Flow Control: None

Rowe Technology Inc. has the Pulse software package for communicating and configuring an ADCP. You can use Pulse verify communication with the ADCP. Any other serial application will work. An alternative to Pulse is Putty, which is a free and popular communication software. It can be found at: http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe .

Open Pulse and go to Settings -> Serial Ports
Set the correct settings for the ADCP and click on the BREAK button. This will send a BREAK to the ADCP. The BREAK is used to wake the system up. If you see output from the ADCP after sending a BREAK, then you know the system is working. If the ADCP is pinging, you can press "Stop Ping" to stop the ADCP from pinging.

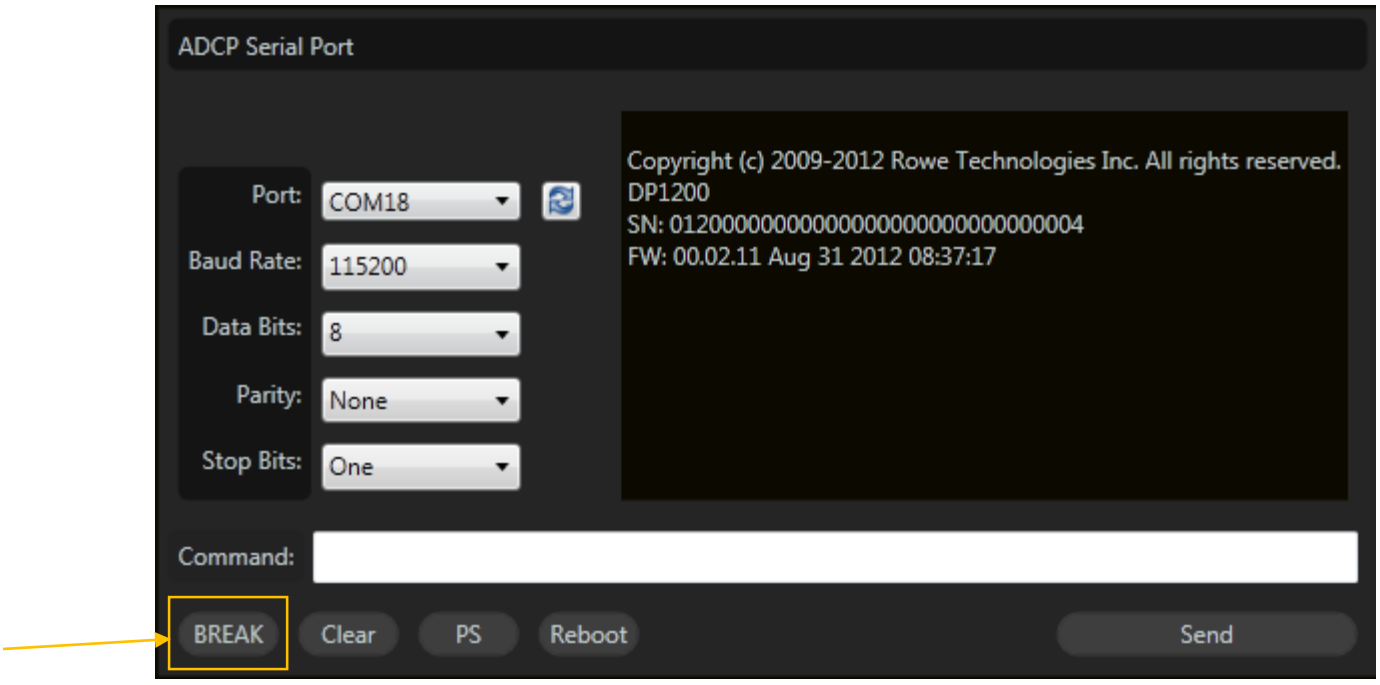


Figure 12: Serial port with BREAK statement

2.1. BREAK with Putty

Right click on the Putty window, then select “Special Command”->BREAK.

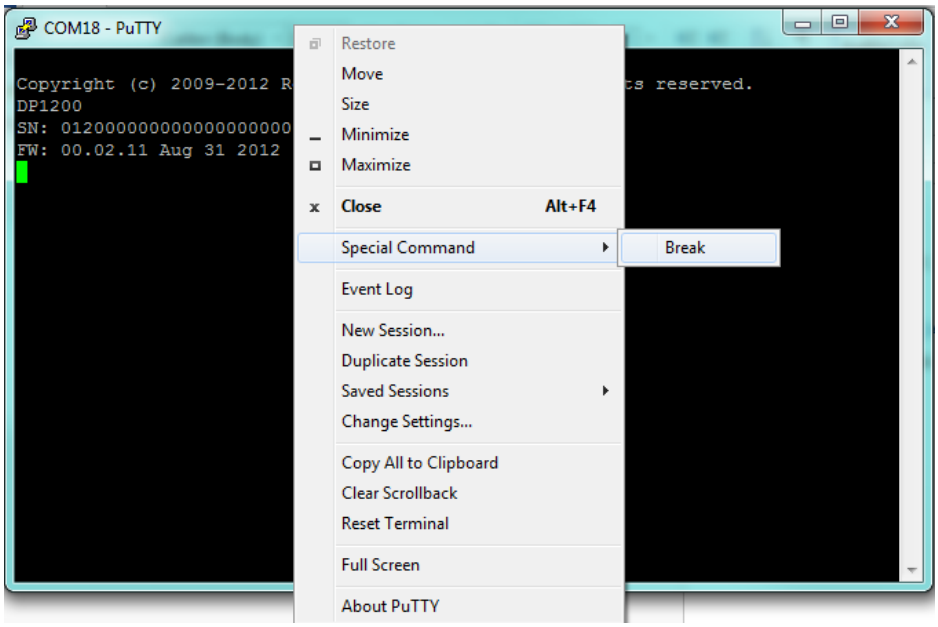


Figure 13: Putty BREAK

2.2. No Serial Communication on RS-XXX Port

When power is reapplied to the ADCP, sometimes there will be no ADCP data output on the serial line. It was working before you powered it down, but now no data is being output.

Try connecting to the other serial line. See if data is being output on that serial line. When power is disconnected, the ADCP logs which serial line was the last serial port to send a CSAVE and will use that serial line on power up to output ADCP data again.

So to ensure data will be output on the serial line you would like to use on power up, send a CSAVE before powering down.

2.3. Long Break

The ADCP has a built fail safe if the baud rate cannot be set or a reset to the ADCP needs to be done. By sending a 15 second break, the ADCP will reset and all the baud rates will be reset to 115200. Within RTI_Utilities, under the Terminal tab is a button, “FORCE STOP”. Click this button and wait for the countdown to complete. The baud rate in the software will automatically be set to 115200 if it is not set already. A BREAK statement will be seen if communication was reestablished.

2.4. RCVR Error or I2C Receiver Error

This is an error message not to be concerned about. Usually this message will be seen when powering up the system. The system is attempting to use an I2C bus but it is currently busy. When the ADCP has completed booting, the I2C will be ready to be used. This is usually only seen once. If the ADCP continues to output this message, contact Rowe Technology Inc. customer service for further instructions.

Ex:

RCVR error result = 2

I2C Receiver ERROR result = 2

1 = Busy I2C

2 = Timeout Error. No I2C response.

3 = Stop Timeout. I2C message sent, and waiting for a complete, but no complete received.

3. Verify Power to ADCP

If no communication is seen from the ADCP, the first step is to verify the ADCP is getting adequate power.

- Verify that the brick is functionally properly by checking the voltage on the underwater cable.
- Verify a glow is seen on the ADCP housing.
- Verify the current draw.

If these are verified, and pass, then the issue is possibly not with the power. Move on to the next section. If any of these fail, continue with this section.

3.1. Power Brick Fails

If the power brick is not giving the correct voltage, contact Rowe Technology Inc. for a replacement part. A power supply can be temporarily used as a replacement.

3.2. Glow Not Seen on Housing

If a glow is not seen on the ADCP housing and the power brick is functionally properly, then this is a sign that there is an issue with the ADCP board stack. Contact Rowe Technology Inc. for further assistance.

Figure 14: ADCP LED Glow

Warning:

The customer runs the risk of allowing too high a voltage or current.
Use a separate power supply at the customers own risk.

Voltage: 24v
Current: 2A

3.3. Verify Current Draw

If the ADCP is drawing to much current, then there is possibly a short in the electronics. This will show you how to verify the current draw. The ADCP should draw around 200mA of current when sleeping at 20v and will fluctuate if it is pinging. If the ADCP is drawing well above 200mA consistently and the underwater cable and power brick is not an issue, then this is usually a sign that there is an issue with board stack and contact Rowe Technology Inc. for further assistance.

To test the current draw, connect the power brick pin 1 to the underwater cable pin 1 of the power connector. Then connect the multimeter to the pin 2 of the underwater cable and pin 2 of the power brick. Set the multimeter to read current. Ensure the underwater cable is plugged into the ADCP.

Voltage	Current Draw
20 Volts	200 mA
35 Volts	110 mA

If the ADCP is asleep, you may see little to no current draw. Try to disconnect power and reconnect power to the ADCP. Look at the initial current draw just after connecting power. If the ADCP is using any current, you will see the current draw for 1 to 2 seconds and then dropped to 0. If the ADCP drops to 0 mA, it usually means the ADCP went to sleep because of no user interaction with the ADCP.

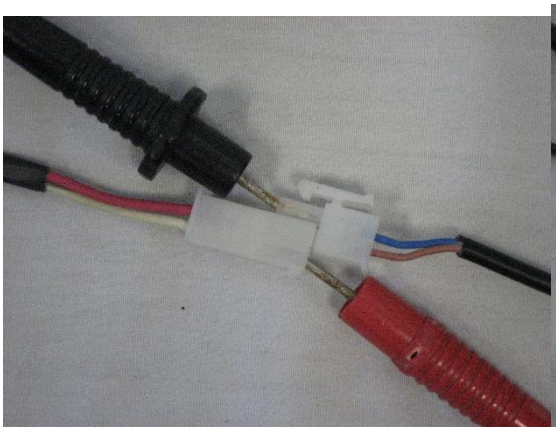


Figure 16: Current Draw Test

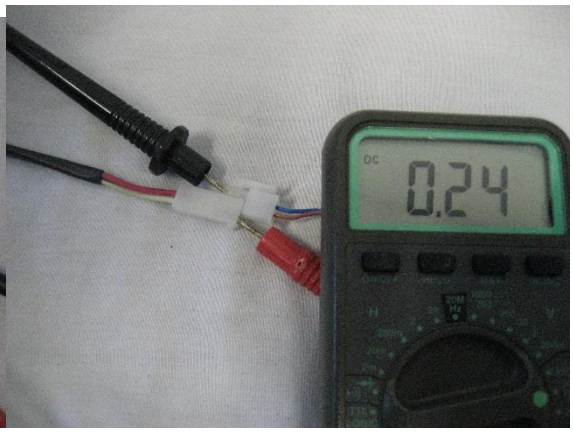


Figure 15: Current Draw connection

4. Troubleshoot the Board Stack

Warning:

Unless you are a properly trained technician, attempting the following instructions will void the warranty on the ADCP. Customers proceed at your own risk.

Warning:

Due to different revisions of board stacks and ADCP, pictures may not be identical. The images are for reference only.

These steps will verify that the board stack is having an issue. We will check if there is a short on one of the boards.

Remove the screws holding the ADCP head to the housing. This is usually 4 bolts with washers, lock washer and nuts. Use an 11/32 open-ended wrench with a 9/64 t-handle allen wrench.

Slide the housing slowly down from the transducer. There are 2 connectors connected to the ADCP board stack. Disconnect the two connectors. One is the power connector and one is the

communication connector. The power connector is connected to J1. The communication is connected to J2. Note that J2 and J3 have the same connection, so when reconnecting the boards do not reconnect the connector incorrectly.

4.1. Board Stack LEDs

With the underwater cable connected to power and the housing still connected to the board stack, verify LEDs are on when looking at the board stack. If the board stack has any power, then there will be more than one LED on. Verify you see any LEDs on.

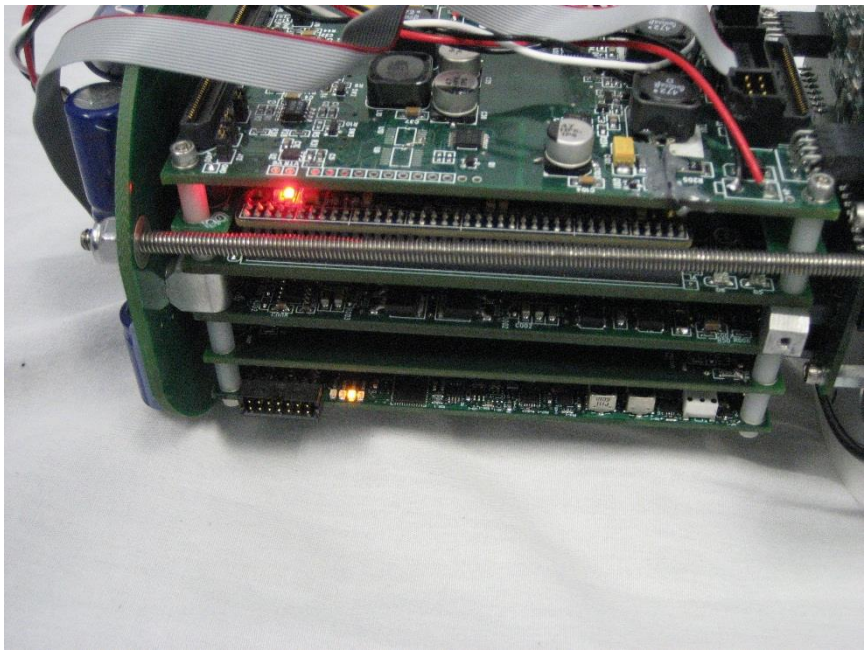


Figure 17: LEDs on board stack

4.2. Verify Proper Voltage on Board Stack

If no LEDs are on, then there may be an issue with the supplied voltage. Verify on J1 that the proper voltage is coming into the board. The voltage will be around 19v if using the power brick.

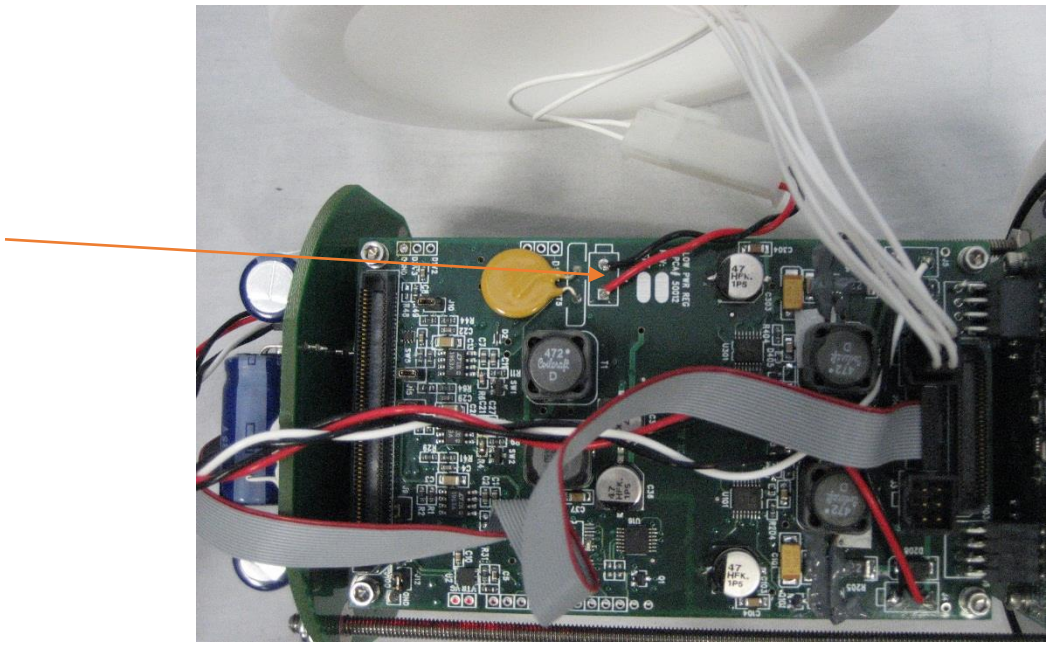
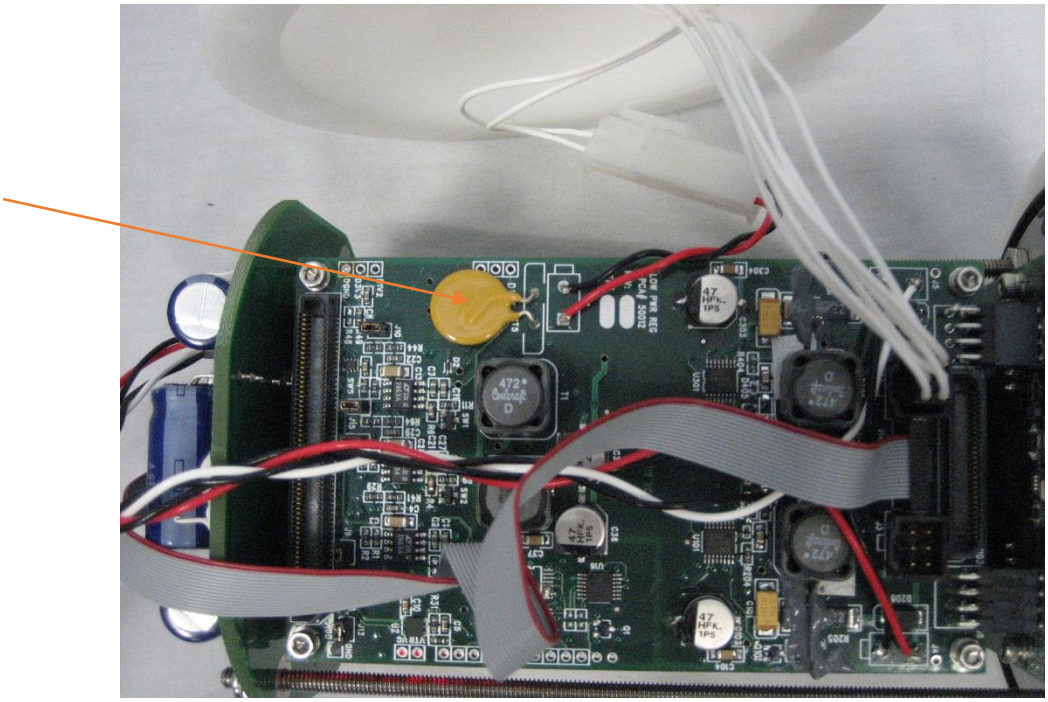


Figure 18: J1 location

4.3. Check for a Short on the Board Stack

If there is a short on any of the board stacks, then RT5 should being to heat up. Place your hand on RT5 and check for any high temperatures. Anything well above room temperature will mean that a board has a short. Contact Rowe Technology Inc. for further assistance.



4.4. Check if the Board Stack is seated to the Transducer

The board stack attaches to the Transducer (Head) by 4 connectors and 2 screws. The screws could be missing, during delivery the ADCP could be mishandled or dropped, the board stack could become disconnected. Check to verify the board stack is properly connected to the PCB board. The PCB board attached to the transducer is the PCB board closes to the transducer that is perpendicular to the rest of the board stack. The screws are on opposite sides of each other and connected to brackets which connect to the transducer.

If the board stack is not properly seated to the PCB board on the transducer, press down on the board stack to reconnect the board stack. Verify the screws are installed and position properly. Then retest the system.

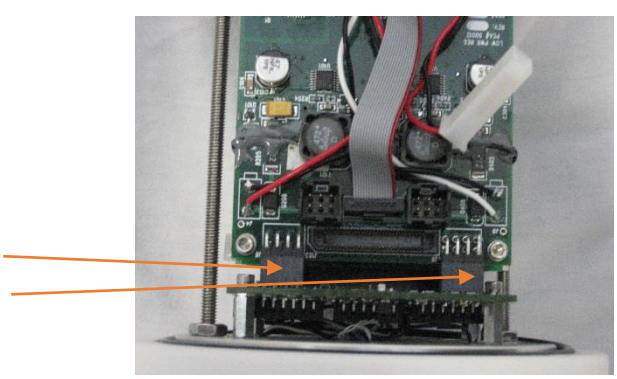


Figure 21: Connection points for the board stack

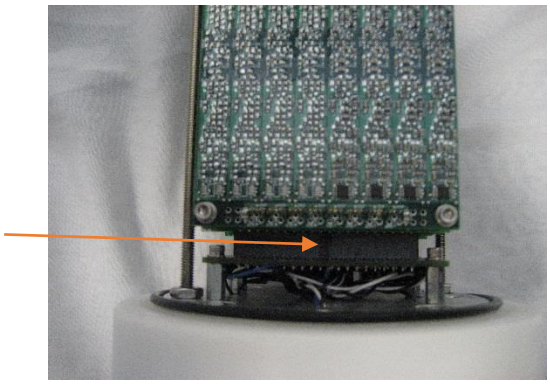


Figure 19: Connection points for the board stack

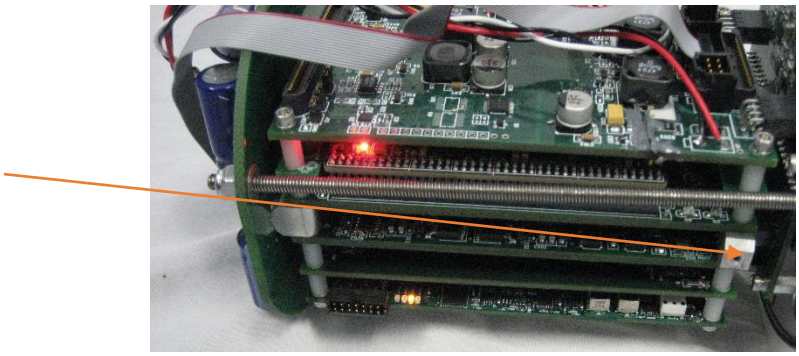


Figure 20: Mounting Bracket. Note: The bracket and screws are removed for this picture.

5. ADCP Settings

5.1. Default Settings

To set the default settings for an ADCP, you will send the CDEFAULT command. These commands will be default for the system frequency and also the type of system you are using: Self Contained, Direct Reading, DVL, Waves, ….

Sometimes the default settings for your ADCP are set for Direct Reading ADCP and you would like your ADCP to use default settings for Self Contained system. The difference between these two types of system is a Direct Reading ADCP will continuously output data and never go to sleep, while a Self-Contained ADCP will sleep to conserve power. To change the CDEFAULT command to use commands more orientated to a Self-Contained system, you will use the ENGDEFAULT command.

ENGDEFAULT 254

253 = DVL

252 = Waves

254 = Self Contained

255 = Direct Reading