PINNACLE 45
DIRECT-READING
DEPLOYMENT GUIDE

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Self-Service Customer Portal

Use our online customer portal at https://www.teledynemarine.com/support/RDI/technical-manuals to download manuals or other Teledyne RDI documentation.

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Teledyne RD Instruments Firmware, software, and Field Service Bulletins can be accessed only via our Teledyne Marine software portal.

To register, please go to https://tm-portal.force.com/TMsoftwareportal to set up your customer support account. After your account is approved, you will receive an e-mail with a link to set up your log in credentials to access the portal (this can take up to 24 hours).

Once you have secured an account, use the Teledyne Marine software portal to access this data with your unique username and password.

If you have an urgent need, please call our Technical Support hotline at +1-858-842-2700.
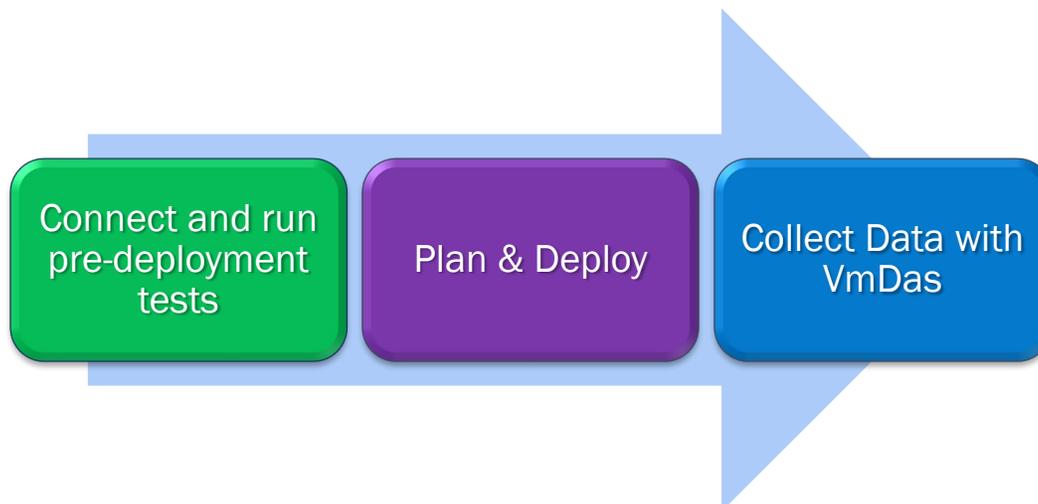
NOTES

System Turnaround Overview

Pinnacle 45 Direct-Read deployments in real time collect, view, and process data collected using the *VmDas* software that is included as part of the Pinnacle Utilities software.

The typical Direct-Reading deployment involves the following tasks:

1. Connect to the Pinnacle ADCP using *Pinnacle Utilities*. Use *Pinnacle Utilities* to run the pre-deployment tests.
2. Plan your vessel-mount deployment.
3. Click the **Deploy** button on *Pinnacle Utilities* and then choose *VmDas*.

- *VmDas* will start collecting data.

> If needed, stop collecting data and modify any customized or specific VmDas settings. For example, there may be a need to turn on the use of GPS or an external heading/pitch/roll device or turn on data export. See the VmDas User's Guide by clicking on the Help menu. *VmDas* will remember the settings on the Data Options screens and use them each time data collection is started.

```
Connect and run        Plan & Deploy        Collect Data with
pre-deployment                                   VmDas
    tests
```

> All real-time data is collected, viewed, processed, and played back using *VmDas*.
>
> When using the DR system type and Vessel Mount wizard, no data is recorded to the Pinnacle's internal recorder. Data is recorded to the *Pinnacle Utilities* working folder.

> For information on *VmDas*, see the VmDas User's Guide by clicking Help in the software.

Connecting to the Pinnacle

CONNECTING TO THE PINNACLE INCLUDES THE FOLLOWING STEPS:

✔ Using Pinnacle Utilities to Connect to the Pinnacle

✔ Setting the System Type to DR

Connecting to the Pinnacle

To establish communications with the Pinnacle:

1. Start the *Pinnacle Utilities* software.

2. Connect the Pinnacle deck box and apply power as shown in the Getting Started guide. Wait five seconds.

3. On power up, the system runs a self-test and the LED will blink.

4. Select **New Serial Connection** or **New Ethernet Connection** depending on the underwater cable type.

5. Enter the ADCP's communication settings.

Serial Communications:

Select the **COM Port** from the drop-down list.

Enter 115200 for the **Baud Rate** from the drop-down list.

Ethernet TCP Communications when the PC is connected to a network:

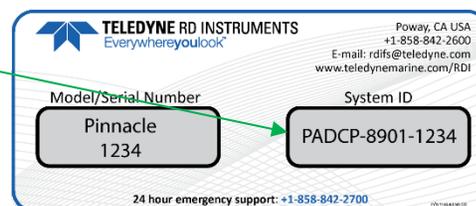Enter the **System ID** PADCP-xxyy-nnnn as shown on the product label.

Enter the **Port Number** 180

⚠ If the PC is NOT connected to a network, see Chapter 1, Configure the PC for a Peer-to-Peer Network Configuration in the Pinnacle Operation manual.

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6. Click the **Connect** button. Once connected, the main screen opens, and the session tab will show.

> 📌 If the Pinnacle is NOT deployed it will go to sleep in five minutes if there is no activity. This is true regardless of Direct-Reading, Self-Contained, Serial COM, or Ethernet communications. The only exception is when Ethernet is connected, and a link is detected. In this case the system will NOT go to sleep.

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> Read the **Getting Started with the Pinnacle** for information on how to connect the cables.
>
> For more information on *Pinnacle Utilities,* click the Help icon (   ) to open the Pinnacle Utilities Software help file.

LED Indications

There is one blue LED mounted on the side of the transducer housing. The blink rates indicate the Pinnacle status as defined below. The LED blinks in an 8-bit pattern representing two seconds of time. Each bit represents 0.25 seconds. A 1 indicates the LED is on, a 0 indicates the LED is off.

Serial Not Deployed: The Pinnacle is configured to communicate via serial channels. The pattern is 10001110 and repeats as long as the system is active. Visually (8 seconds shown):

Ethernet Not Deployed: The Pinnacle is configured to communicate via Ethernet channels. The pattern is 10101110 and repeats as long as the system is active. Visually (8 seconds shown):

Deployed to Ping Now: The pattern is 10001000 and repeats for fifteen minutes. Visually (8 seconds shown):

Deployed to ping in the future: The pattern is 1000000 and repeats for fifteen minutes. Visually (8 seconds shown):

On cold-start power up, the Pinnacle runs a self-test. If the self-test passed, the pattern is 10101010 for two seconds, followed by the "not deployed" state. Visually (8 seconds shown):
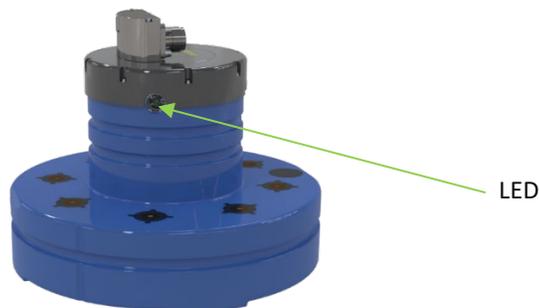
Self-Test Passed Serial:

Self-Test Passed Ethernet:

If the self-test does not pass, then the pattern is 10101010 and is repeated until successful user intervention. Visually:

LED

Setting the System Type

The Pinnacle system type can be Direct-Reading (DR) or Self-Contained (SC). Based on the system type, *Pinnacle Utilities* sets important parameters.

To change the system type to DR:

1. Start *Pinnacle Utilities* and connect to the Pinnacle ADCP.
2. Click **Open** on the System + Sensors box.
3. Click **Change** on the Change System Type box.
4. Select the **DR** system type from the drop-down list to match the Pinnacle configuration.

System + Sensors	Change System Type	Pinnacle DR
Open	Change	

Quick Review

✔	📖
✔ Check that you have all the Pinnacle parts. ✔ Check that the software and documentation is installed. ✔ Connect to the Pinnacle	🜨 Read the Getting Started with the Pinnacle 🜨 Always close the TRDI software connection to the system by clicking on the X (✖) in the session tab and then power down the Pinnacle before disconnecting the Ethernet cable. If the Ethernet link drops while an active connection exists with TRDI Software, then you may need to cycle power to the Pinnacle to reconnect.
✔ Set the System Type to DR	🜨 Based on the system type, *Pinnacle Utilities* sets where the data will be recorded, to allow or not allow a deployment if a working recorder is not detected, and to enable or disable data buffering. For more information, see the CD and CG commands in the Pinnacle Operation manual.

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Pre-Deployment Checks
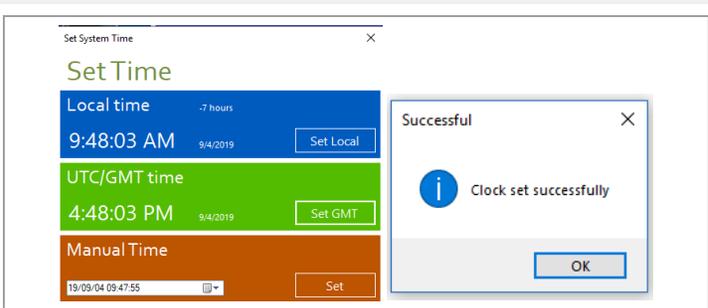
DEPLOYING THE PINNACLE INCLUDES THE FOLLOWING STEPS:

✔ Setting the Pinnacle clock

✔ Testing the Pinnacle

✔ Zero pressure sensor

Pinnacle Utilities has a user-friendly interface for running the pre-deployment tests.

Setting the Pinnacle Clock

The real-time clock (date and time) within the Pinnacle maintains the correct time while system power is removed. The clock is powered by a lithium battery on the CPU board.

To set the ADCP's real-time clock:

System Time 8:19:43 AM 1/8/2019 Set Time	Setup the communication parameters between *Pinnacle Utilities* and the ADCP. Click **Set Time**.

Set System Time ✕ **Set Time** Local time -7 hours 9:48:03 AM 9/4/2019 Set Local UTC/GMT time 4:48:03 PM 9/4/2019 Set GMT Manual Time 19/09/04 09:47:55 Set **Successful** ✕ ⓘ Clock set successfully OK	Choose **Set Local** or **Set GMT**. *Pinnacle Utilities* will set the clock to match the PC's time or GMT. Click **OK** at the **Clock set successfully** screen.

Testing the Pinnacle
To run the Built-in tests:

Setup the communication parameters between *Pinnacle Utilities* and the Pinnacle.

Place the Pinnacle system in enough water to cover the transducer face. Use wood strips or a hoist to lift the transducer to protect the face.

The Pinnacle system MUST be in water when you run the test. The test will fail if done in air. Only a failure with the transducer at a minimum in contact with water is a relevant test.

Click **Open** on the System + Sensors box.

Click on the System Tests **Run** button.

Click **OK** at the **All tests passed** screen.

Testing the Sensors
To view the sensor data:

Start *Pinnacle Utilities* and connect to the Pinnacle ADCP.

Click **Open** on the System + Sensors box.
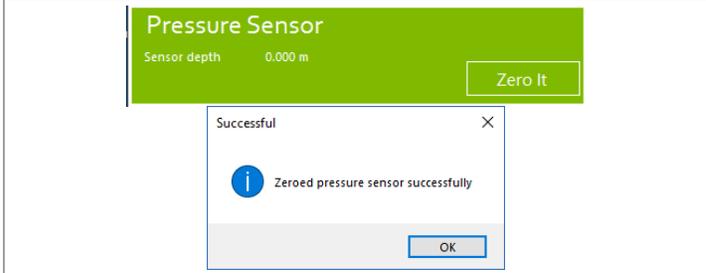

Click **Start** on the Sensor Data button.

To verify the sensors are functional rotate and tilt the system and verify the Pitch and Roll sensor data is reasonable. Rotate the system clockwise and verify the heading increases. Validate the accuracy of beam 3 at 0, 90, and 180 degrees. If the heading is off by more than 2 degrees, calibrate the compass. If the pressure is not zero, zero the pressure sensor.

Click the **X** on the **Sensors** screen to exit the sensor test.

Zero the Pressure Sensor

Zero the pressure sensor at the deployment site, prior to deploying the Pinnacle in the water.
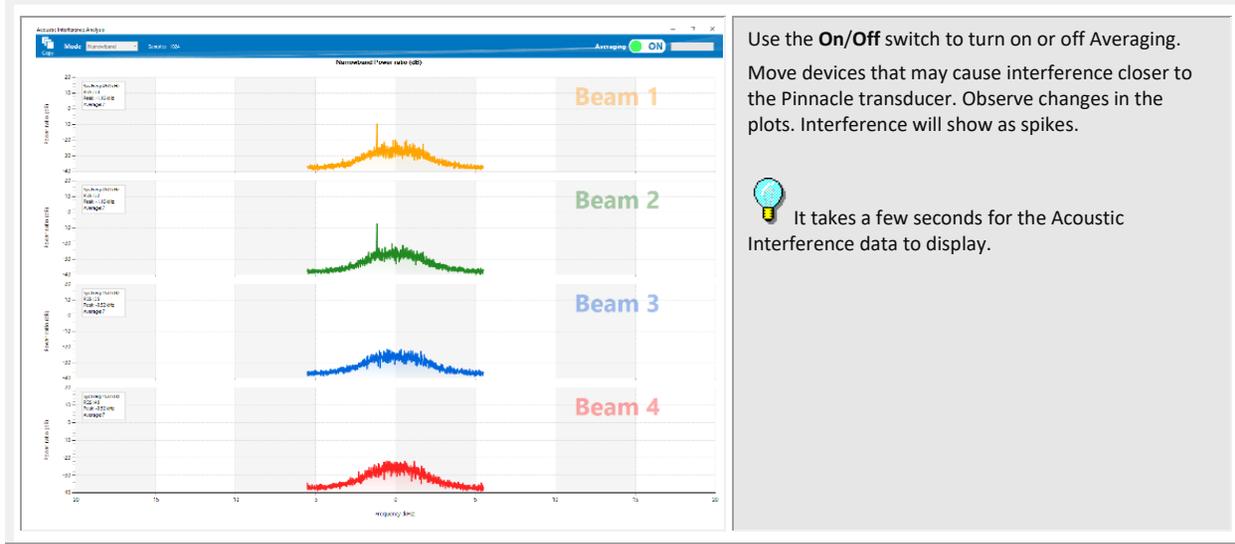
To zero the pressure sensor:
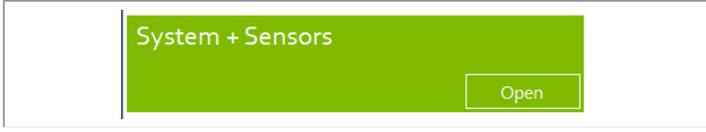
System + Sensors Open	Setup the communication parameters between *Pinnacle Utilities* and the ADCP. Click **Open** on the System + Sensors box.

Pressure Sensor Sensor depth 0.000 m Zero It Successful × ⓘ Zeroed pressure sensor successfully OK	Click **Zero It** on the Pressure Sensor box. This will zero the pressure sensor. Click **OK** at the **Zeroed pressure sensor successfully** screen.

Testing for Acoustic Interference

Observation of the acoustic interference plots will provide information about interference to the Pinnacle ADCP. The *Pinnacle Utilities* software provides the user with a frequency domain plot (~100% band-width) of the Pinnacle's four receiver channels during a sampling interval.

To view the Acoustic Interference Analysis data:

System + Sensors Open	Start *Pinnacle Utilities* and connect to the Pinnacle ADCP. Click **Open** on the System + Sensors box.

Acoustic Interference Analysis Start	Click **Start** on the Acoustic Interference Analysis box.

Use the **On/Off** switch to turn on or off Averaging.

Move devices that may cause interference closer to the Pinnacle transducer. Observe changes in the plots. Interference will show as spikes.

💡 It takes a few seconds for the Acoustic Interference data to display.

Quick Review

✔ All maintenance items (as needed) were done including set clock, run tests, and zero pressure sensor.	📖 Read Chapter 2 in the Pinnacle Operation Manual for information on how to install/mount the Pinnacle for a deployment.
You should test the Pinnacle ADCP: ✔ When you first receive the system. ✔ Before each deployment or every six months. ✔ When you suspect instrument problems. ✔ After each deployment.	📖 The Pinnacle system MUST be in water when you run the test. The test will fail if done in air. Only a failure with the transducer at a minimum in contact with water is a relevant test.

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Planning the Deployment

PLANNING THE DEPLOYMENT INCLUDES THE FOLLOWING STEPS:

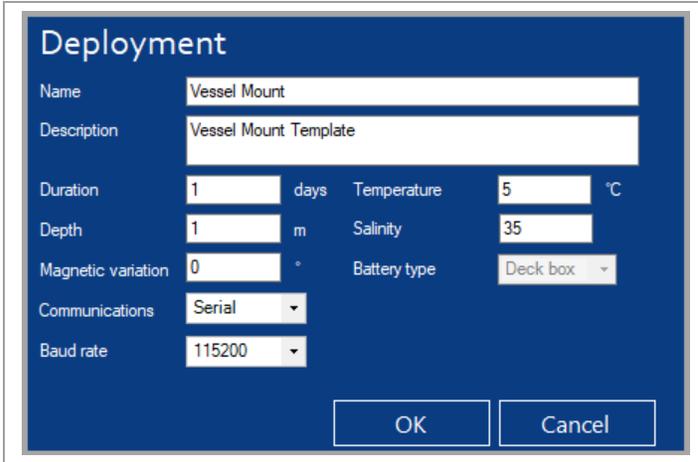✔ Creating a vessel mount command file using Pinnacle Utilities

Use *Pinnacle Utilities* to plan the deployment and create a command file.
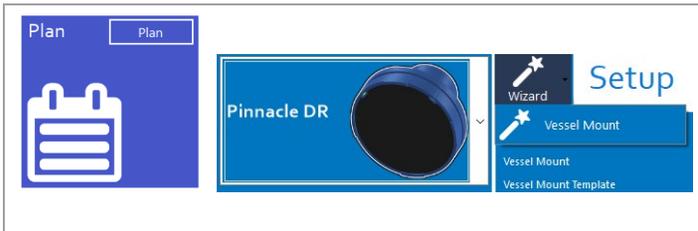
To create a command file:

Start *Pinnacle Utilities*.

On the start screen, click **Plan**.

Set the System Type to DR.

Click the **Wizard** button ( ).

Select the **Vessel Mount** deployment.

For help on using *Pinnacle Utilities*, click the icon.

Click the **Change** button on the **Deployment** tab.

Enter a **Name** and **Description** for the deployment.

Use this screen if the communications settings need to change. Using long data cables may require a slower Baud rate.

Click **OK** to save the settings.

Check the **Ping Type** tab has **Narrowband**, **Broadband**, and **Bottom track** active.

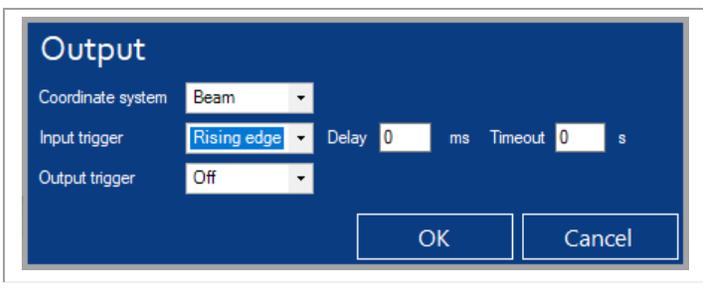 This is the default setting when the Vessel Mount Wizard is selected.

Schedule

Change

00:00:00   00:00:08   00:00:16   00:00:24
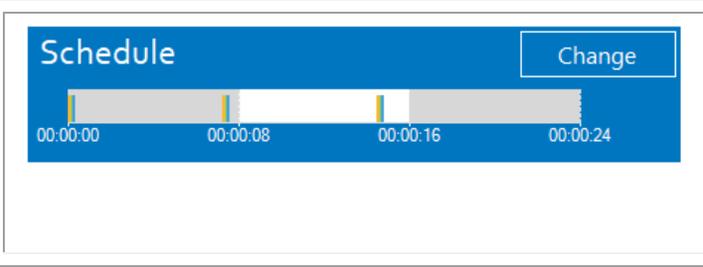
Set the **Schedule** tab to use **Interleaved**, **ping as fast as possible**, and **Number of pings** to 1.

If data will be collected with *VmDas*, the **Water profile**, **Narrowband profile**, and **Bottom track** pings must be set to 1.

💡 This is the default setting when the Vessel Mount Wizard is selected.

Output

Coordinate system   Beam

Input trigger   Rising edge   Delay 0 ms   Timeout 0 s
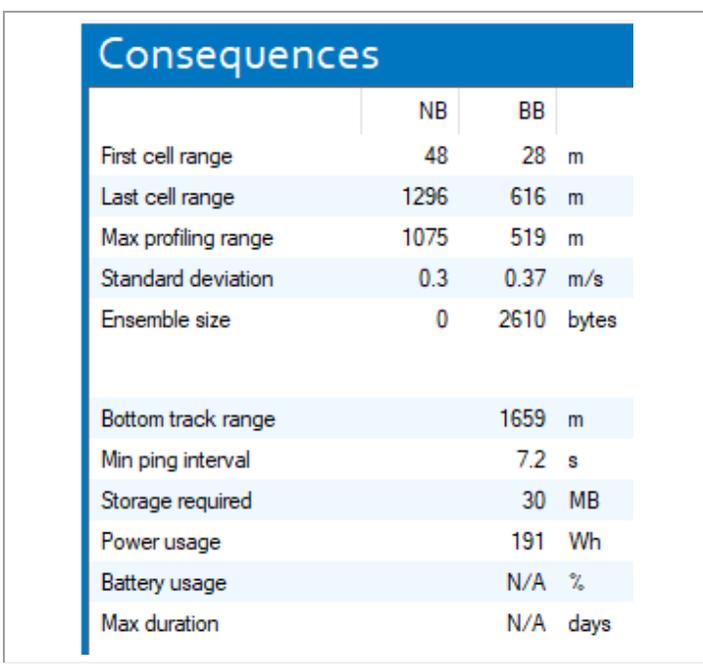
Output trigger   Off

OK   Cancel

Click the **Change** button on the **Output** tab.

Use this screen to set up the Input and Output triggers if needed.

Click **OK** to save the setting.

💡 The coordinate system is set to **Beam**, but *VmDas* will set the EX command and data is recoded externally to the working folder (i.e. no data is recorded on the internal recorder (SD card)).

Consequences

	NB	BB	
First cell range	48	28	m
Last cell range	1296	616	m
Max profiling range	1075	519	m
Standard deviation	0.3	0.37	m/s
Ensemble size	0	2610	bytes
Bottom track range		1659	m
Min ping interval		7.2	s
Storage required		30	MB
Power usage		191	Wh
Battery usage		N/A	%
Max duration		N/A	days

View the Storage required consequence and verify the computer used to collect data has sufficient hard disk space.

💡 **Storage required** is shown for one day.

Save

Click **Save** and save the command file.

💡 The command file will save to the working folder by default.

Quick Review

| ✔️	📖
✔ Check the System Type is set to DR	🔄 Pinnacle Utilities sets where the data will be recorded, to allow or not allow a deployment if a working recorder is not detected, what wizards are available, and to enable or disable data buffering. For more information, see the CD and CG commands in the Pinnacle Operation manual.
✔ Check that the resources for the deployment are acceptable.	🔄 Use the Pinnacle Utilities screens to verify all consequences. 🔄 If data will be collected with VmDas, the **Water profile**, **Narrowband profile**, and **Bottom track** pings must be set to 1.

# Collecting Data

COLLECTING DATA INCLUDES THE FOLLOWING STEPS:

✔ Starting VmDas

✔ Viewing data using the VmDas software

All Real-Time data is collected, viewed, processed, and played back using *VmDas*.

System + Sensors Open	Start *Pinnacle Utilities* and connect to the Pinnacle ADCP. Run the pre-deployment checks.

Change System Type Change	On the System + Sensors screen, change the System Type to DR.

Setup Data Collection Start	Click **Start** on the Setup Data Collection box.

Pinnacle DR · Wizard · Setup Vessel Mount Vessel Mount Vessel Mount Template	Use the *Pinnacle Utilities* Wizard to plan a **Vessel Mount** deployment (see Planning a Deployment).

Deploy · VMDAS Go	Click the **Deploy** button. For moving vessel deployments, click **Go** on the VmDas box.

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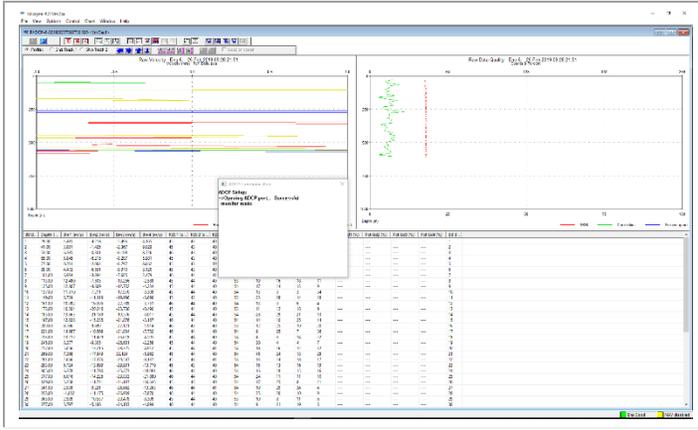
VmDas will begin collecting data.
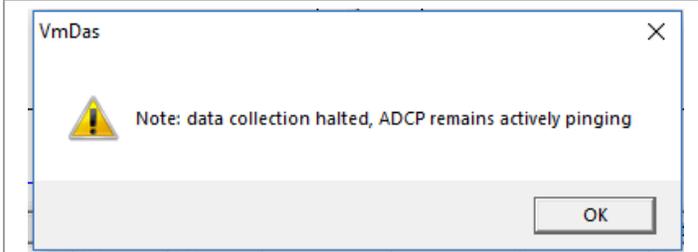
Note that *VmDas* will open in **Monitor** mode. When you exit *VmDas*, the ADCP will continue pinging. Connect again to the ADCP with *Pinnacle Utilities* to stop pinging.

Quick Review

✔ Use the Pinnacle Utilities Plan screens to create the command file.	🕮 Use the *Pinnacle Utilities* Vessel Mount Wizard to plan or open a deployment. 🕮 If data will be collected with *VmDas*, the **Water profile**, **Narrowband profile**, and **Bottom track** pings must be set to 1.

Conclusion

Congratulations! You have completed the Pinnacle Direct-Reading Deployment Guide. Read the following chapters in the Pinnacle Operation Manual for more detailed information.

PINNACLE OPERATION MANUAL

- **Chapter 1 – Overview**
  This chapter includes an overview of the Pinnacle features, options, computer and power requirements, and connecting to the Pinnacle.

- **Chapter 2 – Installation**
  Use this chapter to plan your installation requirements.

- **Chapter 3 – Deployments**
  Use this chapter for an overview of collecting data using Pinnacle Utilities and the data file structure.

- **Chapter 4 – Maintenance**
  This chapter covers Pinnacle maintenance. Use this section to make sure the Pinnacle is ready for a deployment.

- **Chapter 5 – Troubleshooting**
  Use this chapter if the Pinnacle fails the pre-deployment test.

- **Chapter 6 – Returning Systems to TRDI for Service**
  Use this information to obtain a Return Material Authorization (RMA) number if the Pinnacle needs to be returned to TRDI.

- **Chapter 7 – Specifications**
  This chapter includes specifications and dimensions for the Pinnacle (including outline installation drawings).

- **Chapter 8 – Commands**
  This chapter explains how commands used by the Pinnacles.

- **Chapter 9 – Output Data Format**
  This chapter explains the PD0 output data format used by the Pinnacles.

- **Appendix – LongRanger to Pinnacle Transition**
  Use this appendix if you are a LongRanger user and now using a Pinnacle system

PDDecoder Library in C language

The Teledyne Marine PDDecoder library is an open-source library written in C language to decode the PD0 data formats that are commonly output by Teledyne Marine/Teledyne RD Instruments ADCPs.

Available for download from the Teledyne portal at https://tm-portal.force.com/TMsoftwareportal/s/

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