LongRanger & QuarterMaster Deployment Guide

TELEDYNE RD INSTRUMENTS
Everywhereyoulook™

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HOW TO CONTACT TELEDYNE RD INSTRUMENTS

If you have technical issues or questions involving a specific application or deployment with your instrument, contact our Field Service group:

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For all your customer service needs including our emergency 24/7 technical support, call +1 (858) 842-2700

Self-Service Customer Portal

Use our online customer portal at http://www.teledynemarine.com/rdi and click on the **Support** link to download manuals or other Teledyne RDI documentation.

Teledyne Technologies Secure Extranet

Teledyne RD Instruments Software / Firmware / Field Service Bulletins downloads can now be accessed only via our secure customer support portal.

To access these files, please click here 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). If you have an urgent need, please call our field service hotline at +1-858-842-2700.

Preparing the ADCP

PREPARING THE ADCP INCLUDES THE FOLLOWING STEPS:

- Checking you have all of the LongRanger/QuarterMaster parts
- Installing the documentation and software
- Registering Velocity software
- Installing the batteries
- Checking the system is closed properly

Identifying what's in the Box

Included with the LongRanger/QuarterMaster system:

Part Number	Name	Description
WHLS75, WHLM75 WHS150, WHM150	LongRanger QuarterMaster	The LongRanger/QuarterMaster system includes the transducer, Memory card (Sentinel only), dummy plug, and protective cap. When unpacking, use care to prevent physical damage to the transducer face and connector. Use a soft pad to protect the transducer.

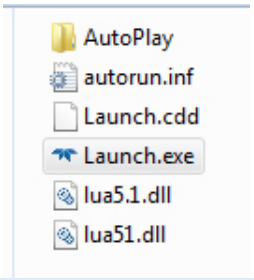
Included with the LongRanger/QuarterMaster Accessories Kit:

Part Number	Name	Description
MRDI1006 MRDI1019 707-7003-00	Shipping case 75 kHz Shipping case 150 kHz shipping pallet	Shipping case with custom foam cutouts or shipping pallet.
717-3030-xxx	I/O cable	The I/O cable is used for serial communications.
717-3014-00	AC Power Adapter	The AC Adapter runs on any standard AC power and supplies +48 VDC to run the LongRanger/QuarterMaster when the batteries are not connected.
737-3010-00	RS-422 to RS-232 Converter (Direct-Reading only)	Converts RS-422 to RS-232 for serial communications.
757K6023-00	Alkaline Battery Pack (Self-Contained systems only)	LongRanger/QuarterMaster batteries are shipped inside the ADCP but **not connected**. Connect the battery and seal the ADCP before deployment.
977-6013-00	Memory (Self-Contained systems only)	The LongRanger/QuarterMaster ADCP includes one memory card installed inside the system. Two PCMCIA memory card slots are available for all ADCPs.
757K6153-00 Documentation Kit	Marine Measurements CD 97Z-8000-00	This CD has PDF versions of all of the LongRanger/QuarterMaster documentation including the WorkHorse ADCP Commands and Output Data Format Guide. Please read the manual!
	RDI Tools and TRDI Toolz	Utility and testing software package that can be used to test the ADCP.
	WinSC /PlanADCP	The *WinSC* program works as a shell program to launch the *PlanADCP* program. The *PlanADCP* program allows the user to create a deployment configuration file. After creating a deployment configuration file (or loading an existing file) the *WinSC* program will continue with the testing, deployment, recovery of data, and quick view of the data.
	WinADCP	Gives users a visual display of the entire set of data. You can zoom in on a portion of the data for closer analysis and export data to text or MatLab files. For detailed information on how to use WinADCP, see the WinADCP User's Guide.
	Velocity Activation Code	Activation code that unlocks the Velocity software.
	Deployment Guide 957-6288-00	A printed guide showing LongRanger/QuarterMaster inventory to deployment steps. A PDF version is included on the Marine Measurements CD.
957-6287-00	Getting Started	A printed sheet showing LongRanger/QuarterMaster set up. A PDF version is include on the Marine Measurements CD.
757K6044-xx	Spare parts and tools	Contains tools, O-Rings, and close-up hardware. See the LongRanger/QuarterMaster Operation Manual, chapter 4 for a list of included parts.
817-6034-00	Battery pack guides	Use the battery pack installation guides to help align the battery pack modules onto the threaded rods.

Installing Documentation and Software

The LongRanger/QuarterMaster system includes a CD with the documentation and software needed for the system.

To install the Marine Measurements Documentation and Software CD:



1. Insert the CD into the drive and follow the browser instructions on the screen. If the browser does not start automatically, complete steps 2 through 3.
2. Use Windows Explorer® to open the CD drive folder.
3. Double-click on the *launch.exe* file. Follow the browser to view or copy the documentation to your computer.

Many companies require that Autorun be disabled. Double-click on *Launch.exe* to start the browser on all TRDI software and documentation CDs/CDs.

4. Click **LongRanger** to locate the documentation and software needed for the system.

Registering Velocity

When you purchase the *Velocity* software, you will receive an Activation code that unlocks the software. A 30-day trial code is included with the system.

To activate *Velocity*:

- On the License Registration screen, enter your activation code (*xxxx-xxxx-xxxx-xxxx*). Click the **Activate** button. Click the **OK** button and then **OK** once more to close the License registration screen.

The Velocity Activation Code sheet is located in the documentation kit.

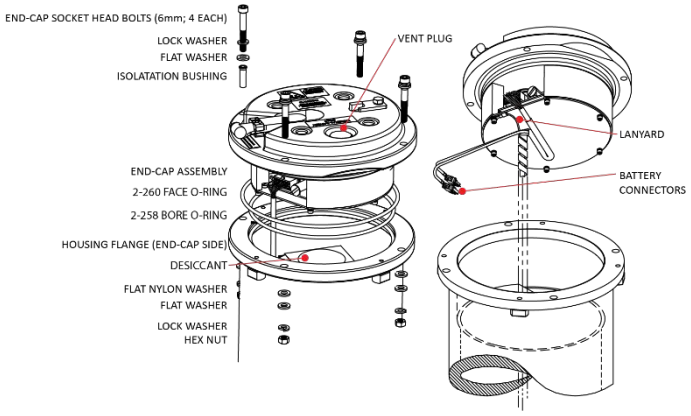
Connecting the Batteries

To connect the battery packs:

Self-Contained system battery packs are shipped inside the system but not connected. Connect the battery and seal the system before deployment.

A lanyard prevents the end-cap from being pulled too far away from the housing to prevent damage to the internal I/O cable. Place a cloth between the end-cap and housing to protect the paint; the lanyard will hold the end-cap.

1. Remove the end-cap by removing the four end-cap bolts.
2. Carefully pull the end-cap away from the housing until you can gain access to the connector jack on the common mode choke. Use care; the plastic mating surfaces scratch easily. Do not damage the mating surfaces.
3. The battery pack power cable connectors are tucked around the battery module. Carefully pull them free.
4. Connect the battery pack power cables to the internal I/O cable.
5. Install the end-cap.



1. Place the end-cap on the housing, aligning the mating holes and the beam 3 number embossed on the end-cap with the beam 3 number embossed on the transducer head.
2. Examine the end-cap assembly nuts, bolts, and washers (6-mm) for corrosion; replace if necessary.
3. Install all four sets of hardware until “finger-tight.”
4. Tighten the bolts to the recommended torque value of 5.6 Newton-meters (50 pound-inches).

For high pressure systems, see the LongRanger/QuarterMaster Operation Manual, Chapter 4 for instructions on end-cap replacement.

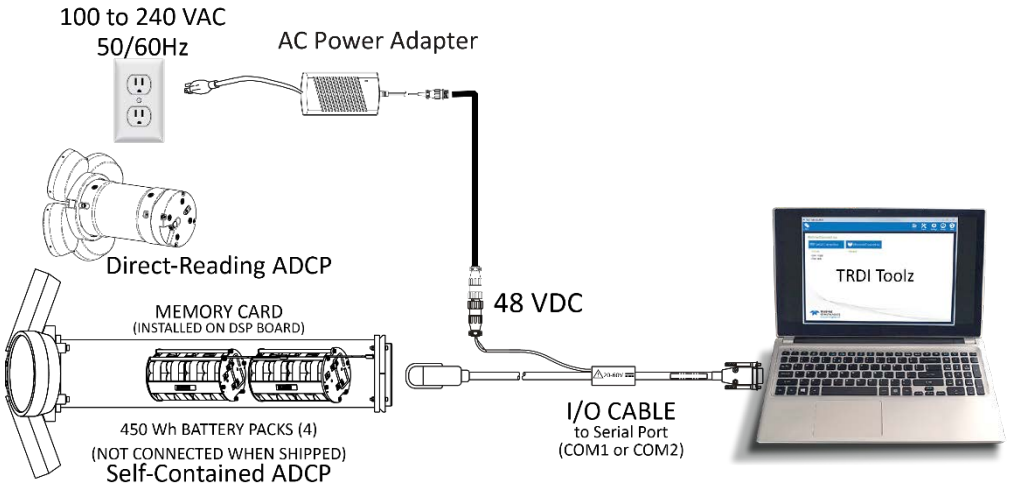
Quick Review

	
✔ Check that you have all of the LongRanger/QuarterMaster parts.	If you are missing parts, contact TRDI support rdifs@teledyne.com or call +1 (858) 842-2700.
✔ Check that the software and documentation is installed.	If the CD browser does not automatically start, double-click on the *launch.exe* file. Install Velocity, TRDI Toolz, WinSC, PlanADCP, WinADCP, and the LongRanger/QuarterMaster documentation.
✔ Check that the system is closed properly.	For more information about installing the batteries and system close-up, see chapter 4 in the LongRanger / QuarterMaster Operation Manual.

Connecting to the ADCP

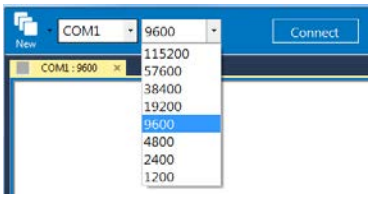
CONNECTING TO THE ADCP INCLUDES THE FOLLOWING STEPS:

- Using TRDI Toolz



Connecting to the ADCP

To establish communications with the LongRanger/QuarterMaster:



1. Connect the system and apply power.
2. Start the *TRDI Toolz* software.
3. Select **New Serial Connection**.
4. Enter the ADCP's communication settings. Select the **COM Port** the serial cable is connected to and set the **Baud Rate** from the drop down lists.
5. Click the **Connect** button. Once connected, the button will change to **Disconnect**.
6. Click the **Break** ( ) button. From the **Break** button drop down menu, select **Soft Break** (= = =). The wakeup banner will display in the terminal window.


```
[BREAK Wakeup A]
WorkHorse Broadband ADCP Version 50.41
Teledyne RD Instruments (c) 1996-2010
All Rights Reserved.

>
```

It may be necessary to click inside the terminal window and then click the **Break** button to wake up the system.

If you are unsure of the ADCP's baud rate, use **Tools**, **Find ADCP**. *TRDI Toolz* will try different baud rates until it connects to the ADCP.

```
>{¡ɿφ²∩╝╝²²jñ~ªñδgJ Checking 9600 baud rate
Checking 115200 baud rate
==
WorkHorse Broadband ADCP Version 50.41
Teledyne RD Instruments (c) 1996-2010
All Rights Reserved.

>
```

Long Ranger / QuarterMaster batteries are shipped inside the ADCP but not connected. Connect the battery and seal the ADCP before deployment.

For testing, the battery can be disconnected to save battery power. If the battery is connected, use the AC power adapter to override the battery voltage to conserve the battery.

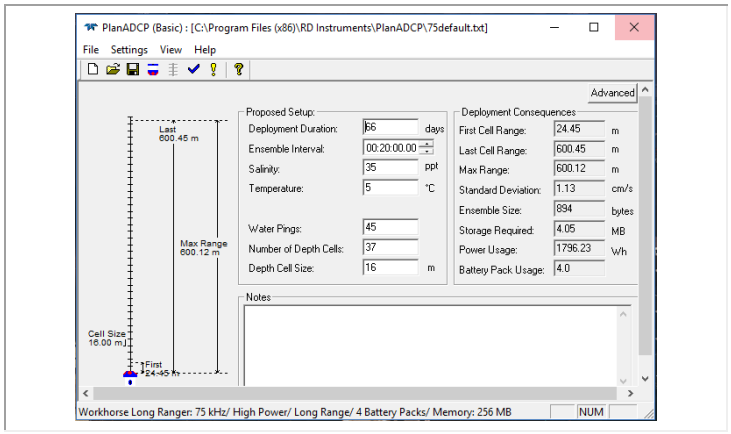
Quick Review

Verify the wakeup banner displays	For help on using *TRDI Toolz*, click the Help icon.

Planning the Deployment

PLANNING THE DEPLOYMENT INCLUDES THE FOLLOWING STEPS:

- Creating a command file using PlanADCP



Use the *PlanADCP* wizard to create a command file.

Review the consequences.

See the WinSC and PlanADCP User's Guide for details.

Quick Review

Check that the resources for the deployment are acceptable.	Use the PlanADCP Basic, Advanced, and Expert screens to verify all consequences.

Deploying the ADCP

DEPLOYING THE ADCP INCLUDES THE FOLLOWING STEPS:

- Setting the ADCP clock
- Testing the ADCP
- Calibrating the Compass
- Sending the commands to the ADCP

Pre-Deployment Checks

TRDI Toolz has a user-friendly interface for running the pre-deployment tests and setting the LongRanger/QuarterMaster real-time clock.

Setting the ADCP Clock

The real-time clock (date and time) within the LongRanger/QuarterMaster 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 clock to match the PC time:

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the button.
3. Click **Tools**, **PC Time to ADCP**.
4. *TRDI Toolz* will send the TS command to set the clock.

```
[BREAK Wakeup A]
WorkHorse Broadband ADCP Version 50.41
Teledyne RD Instruments (c) 1996-2010
All Rights Reserved.

>TS 18/06/17 09:50:34
```

Testing the ADCP

To run the Built in tests:

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the button.
3. Enter the PA direct command to send to the ADCP and then press the **Enter** key or click on **Send**. Refer to the ADCP's manual for a listing of all direct commands and their format.

If any of the tests fail, read Chapter 6 in the LongRanger/QuarterMaster Operation Manual.

Testing the Sensors

To test the sensors:

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the button.
3. Enter the PC2 direct command to send to the ADCP and then press the **Enter** key or click on **Send**.

```
Press any key to quit sensor display ...
Heading   Pitch    Roll   Up/Down    Attitude Temp   Ambient Temp  Pressure
301.01°  -7.42°  -0.73°     Up          24.35°C         22.97°C       0.0 kPa
300.87°  -7.60°  -0.95°     Up          24.36°C         22.97°C       0.0 kPa
```

4. Use the PC2 test to display the sensor values. 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 at 0, 90, and 180 degrees. If the heading is off by more than 2 degrees, calibrate the compass. If the Depth sensor is not zero, zero the pressure sensor.
5. If a sensor fails, contact TRDI Field Service.

See the LongRanger/QuarterMaster Operation Manual, Chapter 5 for details on testing the sensors.

Zero the Pressure Sensor

Zero the pressure sensor at the deployment site, prior to deploying the LongRanger/QuarterMaster ADCP in the water.

To zero the pressure sensor:

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the button.
3. Enter the AZ direct command to send to the ADCP and then press the **Enter** key or click on **Send**.

Calibrating the Compass

The main reason for compass calibration is battery replacement. Each new battery carries a different magnetic signature. The compass calibration algorithm corrects for the distortions caused by the battery to give you an accurate measurement.

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the button.
3. At the > prompt, type **AR** and press the **Return** key. This will return the compass to the factory calibration matrix.
4. At the > prompt, type **AF** and press the **Return** key. Choose option “a” or “b” to start the calibration procedure.

```
Field Calibration Procedure
Choose calibration method:
     a. Remove hard iron error (single cycle) only.
     b. Remove hard and soft iron error (single + double cycle).
     c. Calibration for a single tilt orientation (single + double cycle).
     d. Help.
     e. Quit.
```

5. Tilt the ADCP. Tilt an upward-looking LongRanger/QuarterMaster with a block under one side of the end-cap. A 35-mm block will give you an 11-degree tilt. Check the on-screen instructions to see if the orientation is OK. Adjust as necessary.

The tilts must remain constant during the rotations. The transducer beam is the center point of the rotation.

6. When prompted, rotate the ADCP slowly 360 degrees (approximately 5 degrees per second).
7. The second rotation requires the ADCP to be tilted 15 degrees in another direction than from the first rotation. Follow the on-screen instructions to orient the ADCP correctly. When prompted, rotate the ADCP slowly 360 degrees (approximately 5 degrees per second).
8. The third rotation requires the ADCP to be tilted 15 degrees in another direction than from the first and second rotations. Follow the on-screen instructions to orient the ADCP correctly.
9. If the calibration procedure is successful, it records the new calibration matrix to nonvolatile memory. The ADCP will not change its matrix unless the calibration is properly carried out.
10. If the calibration procedure is not successful, return your ADCP to the original factory calibration, by using the AR command. Try using the AR command if you have trouble calibrating your compass. In some circumstances, a defective compass calibration matrix can prevent proper calibration.

For a detailed explanation of the calibration procedure, see the LongRanger/QuarterMaster Operation Manual, Chapter 4.

A compass calibration should be conducted at each measurement location, and whenever the mounting fixture or ancillary equipment such as batteries are changed or rearranged.

Deploying the ADCP

To send multiple commands to configure the ADCP and start it pinging:

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the  button.
3. On the **Tools** menu, select **Script Editor**.
4. Click the **Open** icon and select the file to run from the scroll-down list. If no extension is given for the script file, an extension of *.txt is assumed.

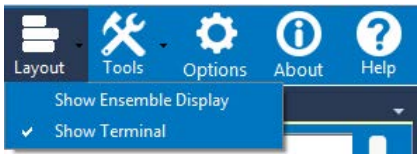
Script files can have any extension as long as they are ASCII text files.

Use TRDI's software *PlanADCP* to create a command file.

5. Click the **Send** icon. Clicking the drop-down menu will show the options to **Send to current** or **Send to all**. Use the **Send to all** feature to send the same script file to all connected ADCPs.

6. Use the **Layout** menu to show or hide the Ensemble Display and Terminal windows. The Ensemble Display shows limited situational data (Ensemble Time, Temperature, Heading, Pitch, Roll,

Bottom track range/velocity, Vertical Beam range) in tabular form from the ADCP data stream, when present.



Note that the Ensemble Display is off when *TRDI Toolz* is first started.

Quick Review

All maintenance items (as needed) were done including set clock, zero pressure sensor, and compass calibration.	TRDI recommends that if you are having trouble calibrating the LongRanger/QuarterMaster compass that you move the system and/or ensure the area around the system is clear of electrical equipment and ferrous materials.
Send the command file to the ADCP	Read Chapter 3 in the LongRanger/QuarterMaster Operation Manual for information on how to install/mount the ADCP for a deployment.

Recovering Data

RECOVERING DATA INCLUDES THE FOLLOWING STEPS:

- Downloading data files
- Viewing data using the Velocity software

Downloading Data Files

To download a data file:

1. Setup the communication parameters between *TRDI Toolz* and the ADCP.
2. Wake up the ADCP by pressing the  button.
3. Click **Tools**, **Recover Recorder**.
4. *TRDI Toolz* sends the "r?" and "m?" commands to verify the recorder type and then uses the RY or MY command to recover the data. The RY and MY command uploads the entire contents of the recorder via the serial interface to a host computer using the standard YMODEM protocol for binary file transfer. The data is transferred to the host and stored as binary files.
5. Once the data has been recovered, the recorder can be erased by sending the command RE ErAsE. This command *is* case sensitive. *Once erased, the data is not recoverable.*

Opening a Data File with Velocity

When a **.PD0* (pd zero, not the letter o) file is opened, *Velocity* creates a matching **.pdv* and **.pjv* files depending on the options selected. The **.pdv* file is used to process data and the **.pjv* file contains the latest information about user selections for processing parameters and data displays.

The original *.pd0 file is never changed, moved, or overwritten.

To open a data file:

1. Start *Velocity*.
2. Click the **Home** button () located in the top left corner.
3. Click the **Options** button and select the options. Data averaging is on by default.
4. Do one of the following:
   - Drag a data file onto the *Velocity* desktop icon. This will start *Velocity* and open the data file.
   - With the **Start** menu selected, on the **Starting actions** area, click **Open a data file** button.
   - Click the **Open** menu button.
5. After the file is opened, a mini preview of the data file will display at the top of the Velocity screen. Click the preview to switch to the session (if other files are opened).

See the Velocity quick reference card. A PDF copy is included when you install the software/documentation CD.

Quick Review

	
Download the data.	Use TRDI Toolz or WinSC to download data.
Check and process the data	Read the Velocity Software User's Guide for information on how to check and process data.

Conclusion

Congratulations! You have completed the LongRanger/QuarterMaster Deployment Guide. Read the following chapters in the LongRanger/QuarterMaster Operation Manual for more detailed information.

LongRanger/QuarterMaster Operation Manual

Chapter 1 – At a Glance

This chapter includes an overview of the LongRanger/QuarterMaster features, options, computer and power requirements, and connecting to the LongRanger/QuarterMaster ADCP.

Chapter 2 – Installation

Use this chapter to plan your installation requirements.

Chapter 3 – Data Collection

Use this chapter for an overview of collecting data using WinSC and PlanADCP.

Chapter 4 – Maintenance

This chapter covers LongRanger/QuarterMaster ADCP maintenance. Use this section to make sure the LongRanger/QuarterMaster is ready for a deployment.

Chapter 5 – Testing the LongRanger/QuarterMaster

Use this chapter to test the LongRanger/QuarterMaster is functioning correctly.

Chapter 6 – Troubleshooting

This chapter covers how to troubleshoot the LongRanger/QuarterMaster ADCP. If the LongRanger/QuarterMaster fails a built-in test or you cannot communicate with the system, use this information to help locate the problem.

Chapter 7 – Returning Systems to TRDI for Service

Use this information to obtain a Return Material Authorization (RMA) number if the LongRanger/QuarterMaster ADCP needs to be returned to TRDI.

Chapter 8 – Specifications

This chapter includes specifications and dimensions for the LongRanger/QuarterMaster ADCP (including outline installation drawings).

WorkHorse Commands and Output Format Guide

Chapter 1 – Introduction to Commands

This chapter explains how commands used by the LongRanger/QuarterMaster ADCPs.

Chapter 2 – Command Descriptions

This chapter defines the commands used by the LongRanger/QuarterMaster ADCPs.

Chapter 3 – Advanced Commands

This chapter defines the Sound Velocity Smart Sensor, Waves, Lowered ADCP, and Ping Synchronization commands used by the LongRanger/QuarterMaster ADCPs.

Chapter 4 - Output Data Format

This chapter explains the PD0 output data format used by the LongRanger/QuarterMaster ADCPs.

Chapter 5 – Special Output Data Formats

This chapter explains the PD3 through PD18 output data formats used by the LongRanger/QuarterMaster ADCPs.

Chapter 6– How to Decode an ADCP Ensemble

This chapter explains how to decode PD0 data.