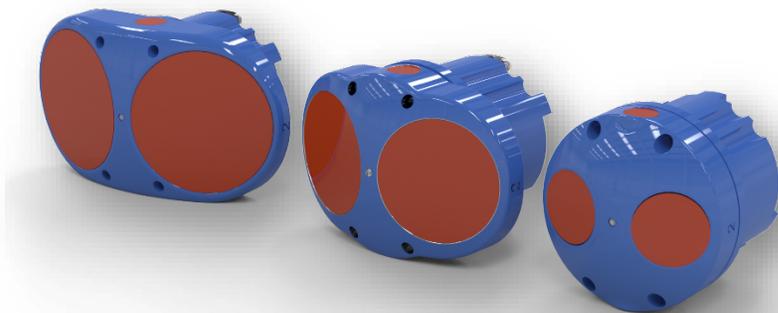


CHANNELMASTER

DEPLOYMENT GUIDE



**TELEDYNE
MARINE**
Everywhere you look™

P/N 95B-6125-00 (September 2023)

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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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Phone +1 (858) 842-2600	Phone +33(0) 492-110-930
Sales – rdisales@teledyne.com	Sales – rdie@teledyne.com
Field Service – rdifs@teledyne.com	Field Service – rdiefs@teledyne.com
Client Services Administration – rdicsadmin@teledyne.com	

Web: <https://www.teledynemarine.com>

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 <https://www.teledynemarine.com/support/RDI/technical-manuals> to download manuals or other Teledyne RDI documentation.

Teledyne Marine Software Portal

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.

ChannelMaster Inventory

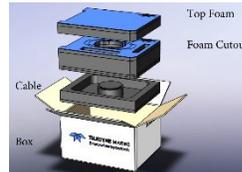
CHANNELMASTER INVENTORY INCLUDES THE FOLLOWING STEPS:

- ✓ Checking you have all the ChannelMaster parts
- ✓ Installing the documentation and software

Identifying what's in the Box

Included with the ChannelMaster system:

Part Number	Name	Description
CM300-I-xxx CM600-I-xxx CM1200-I-xxx	ChannelMaster 300/600/1200 kHz system with communication option indicated by xxx: RS422-> blank SDI-12->UG1 RS232->UG2	The ChannelMaster system includes the transducer, dummy plug, mounting plate, 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.
CM-A or CM-A-UG0 to CM-A-UG4 Accessories Kit	73B-3000-025 73B-3001-025	I/O cable (standard) I/O cable SDI12 (optional)
	73B-6000-00	RS232 to RS422 Converter Cable
	71BK6000-00	Stainless Steel Mounting Plate and hardware
	71B-7011-00	Shipping box
	75BK6001-00	Tools and Spare Parts Kit
75BK6000-00 Documentation kit	95Z-6007-00	Download instructions
	95B-6126-00	Getting Started Sheet



Tools and Spare Parts

A set of tools and spare parts are included with the system (located in the canvas bag).

Part Number	Item Name	Where Used
5020	Silicone Lubricant, 4-Pack	Housing
97Z-6046-00	O-RING, 2-254, DURO 60, EPDM	
M6WASHSPL	WASHER, SPLIT LOCK SST316	
M6WASHSPLTI	WASHER, 6MM SPLIT LOCK TITANIUM	
M6WASHSTD	WASHER, FLAT, 12.5MMOD SST 316	
M6WASHSTDTI	WASHER, FLAT, TITANIUM 12.5MM OD	
M6X1.0X16FHH	SCREW, FLAT HEAD, SOCKET HEAD, SST 18-18	
M6X1.0X16HHTI	SCREW, TITANIUM	
M6X1.0X25HHTI	SCREW, TITANIUM	
M6X1.0X35HH	SCREW, HEX HEAD, SST 18-8	
6958A14	HEX KEY, 4MM, LONG ARM	
7299A25	WRENCH, NUT DRIVER, 10MM	
84Z-6000-00	TOOL BAG, CANVAS	
DES3	DESICCANT, SEALED BAG, 2 UN MIL PAK	
817-1067-00	SCREW, PRESSURE SENSOR	Pressure Sensor
75BK6004-00	KIT, FILL, SILICONE OIL	
3/16BLADE	SCREWDRIVER	

Optional Items

Part Number	Description
977-7003-00	Case, Shipping, WH, WHM, CM
71BK6092-00	<p>Kit with 73B-3016-00 adapter cable and 81B-6090-00 adapter plate.</p> <p>The adapter cable is used to connect a ChannelMaster ADCP RS-232 + SDI-12 system to a Sontek Argonaut SL gen 2 underwater cable.</p> <p>The adapter plate is used for a ChannelMaster to Sontek Argonaut SL1500 Low Profile or 1500 and 3000SL, SL3000 LowProfile, and SL500 Low Profile hole pattern.</p>

System Requirements and Installation

ChannelMaster Utilities software requires a Windows® compatible computer with the following specifications:

- Windows® 10, 8.1, or 7 laptop or desktop computer
- Windows 10 or 8.1® Intel® compatible tablet
- Minimum display resolution of 1024 x 768 (higher recommended)
- Mouse or other pointing device or touch-enabled PC / Tablet

Installing Documentation and Software

The ChannelMaster system documentation and software are downloaded.

1. Follow the instruction sheet on downloading TRDI software and manuals.
2. Software is available on <https://tm-portal.force.com/TMsoftwareportal>. Install TRDI Toolz and ChannelMaster Utilities. Download application software WinH-ADCP or PlanCV as needed.
3. Use our online customer portal at <https://www.teledynemarine.com/support/RDI/technical-manuals> to download manuals or other Teledyne RDI documentation. PDF versions of all ChannelMaster documentation are available for download.



ChannelMaster ADCP Guide



ChannelMaster SDI-12 Guide

Software Name	Purpose	Recommended for:
ChannelMaster Utilities	Single integrated application for maintenance, deployments, and reviewing data. Optimized for the USGS standardized workflow for setup and maintenance.	All users
TRDI Toolz	Utility software for testing and troubleshooting.	All users (as needed)
WinH-ADCP	Real-time discharge data collection program.	Real-Time data collection
PlanCV	Used to create a deployment configuration file for ChannelMaster and V-ADCP systems.	Special applications



All TRDI software can be installed using the “silent install” switches as needed. For example:
 "%~dp0ChannelMaster Utilities v1.3.0.1 setup.exe" /x/enoui /xelog
 "%LogDir%\ChannelMaster Utilities v1.3.0.1 setup_install.log" /qn /norestart

Quick Review

	
✔ Check that you have all the ChannelMaster 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.	🔗 As a minimum, install the ChannelMaster Utilities software.

Connecting to the ChannelMaster

CONNECTING TO THE CHANNELMASTER INCLUDES THE FOLLOWING STEPS:

- ✓ Connecting the cable
- ✓ Connecting to the system using ChannelMaster Utilities

To set up the ChannelMaster:

1. Remove the Dummy Plug and lubricate the connector by placing a light amount of silicone lubricant on the connector pins (rubber portion only). Silicone lubricant is included in the Spare Parts kit.
2. Connect the I/O cable to the ChannelMaster. Do so by pushing straight in against the connector. Roll the retaining strap over the connector.
3. Attach the I/O cable to the computer's communication port.
4. Connect a battery or DC power supply to the power connectors.

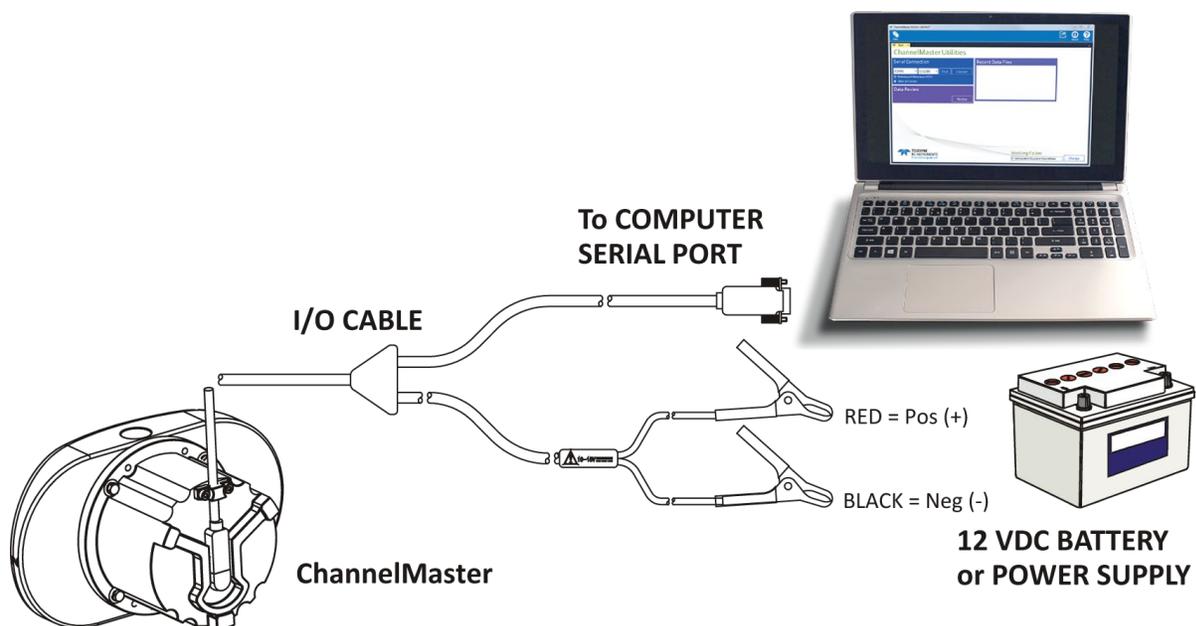


Figure 1. ChannelMaster Connections with RS-232

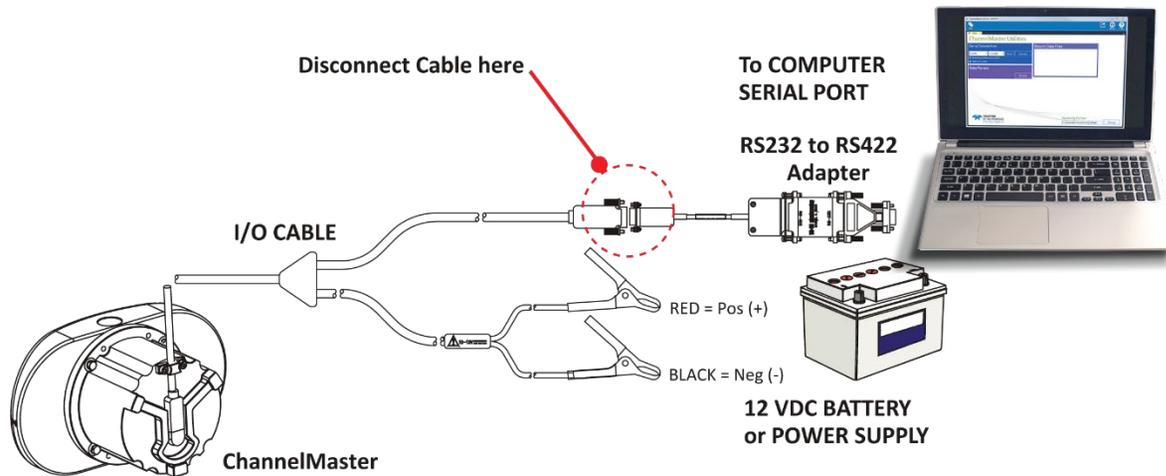


Figure 2. ChannelMaster Connections with RS-232 to RS-422 Adapter

If you ordered the RS-422 configuration, the ChannelMaster is supplied with a RS-232 to RS-422 converter. The RS-232 to RS-422 converter must be disconnected from the ChannelMaster when the cable has been disconnected from the computer. If left connected, the internal battery used to maintain ROM inside the ChannelMaster can be drained or false Breaks may be sent.

The RS-232 to RS-422 converter supplied with the ChannelMaster is powered by the computer's COM port. It may be necessary to use a different converter when very long communication lines are used (maximum 1300 meters).

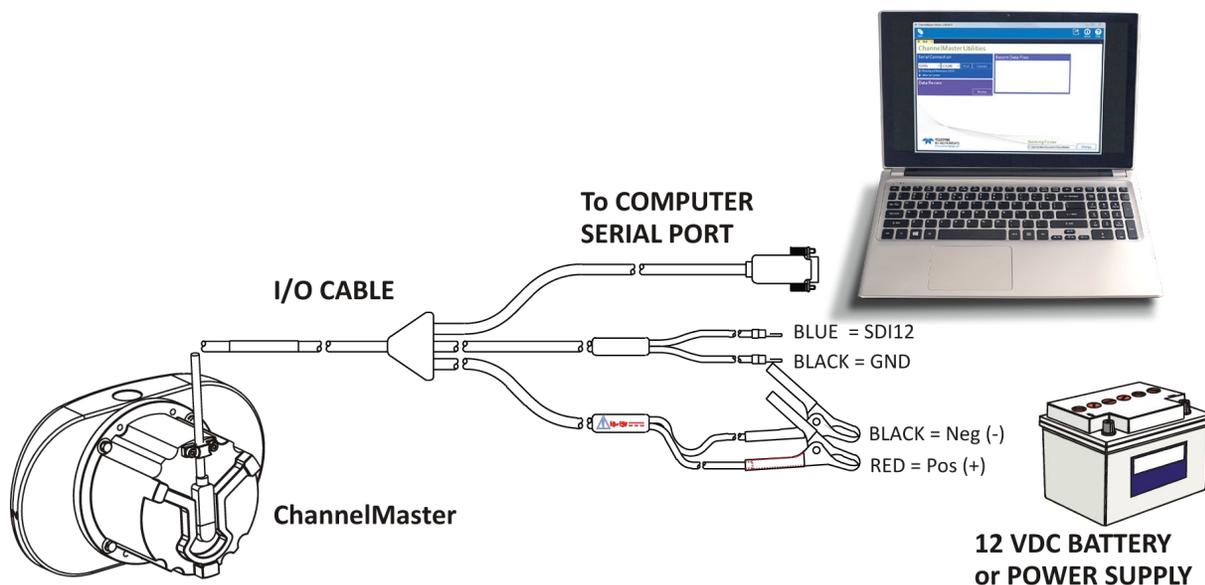
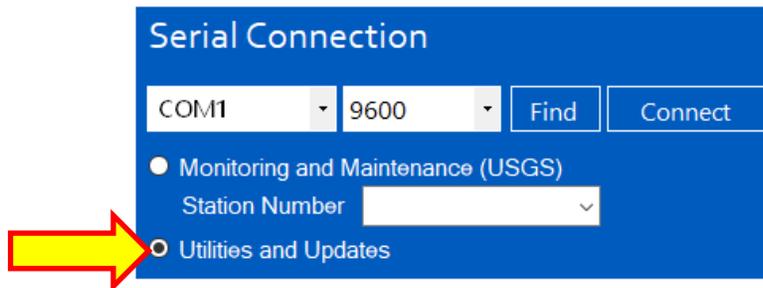


Figure 3. ChannelMaster Connections with SDI12

Using ChannelMaster Utilities

To connect to the ChannelMaster using the ChannelMaster Utilities software:

1. Start the *ChannelMaster Utilities* software.
2. Select the **Utilities and Updates** radio button.



3. Enter the ChannelMaster’s communication settings by selecting the **COM Port** the cable is connected to and **Baud Rate** from the drop-down lists.
4. Click the **Connect** button.

 If you are unsure of the ChannelMaster’s Baud rate or have trouble connecting, click the **Find** button. This will try different Bauds until it can connect, but not different COM ports.

 For more information on *ChannelMaster Utilities*, click the Help icon () to open the ChannelMaster Utilities Software help file.

Quick Review

	
<p>✓ Connect the cable</p>	<p> To protect the connector from damage, place a light amount of silicone lubricant on the connector pins (rubber portion only). Silicone lubricant is included in the Spare Parts kit.</p>
<p>✓ If you have trouble connecting to the ChannelMaster using <i>ChannelMaster Utilities</i>, click the Find button.</p>	<p> The Find button will try different baud rates until it can connect, but not different COM ports.</p>
<p>✓ Use the ChannelMaster Utilities Help file.</p>	<p> For more information on <i>ChannelMaster Utilities</i>, click the Help icon () to open the ChannelMaster Utilities Software help file.</p>

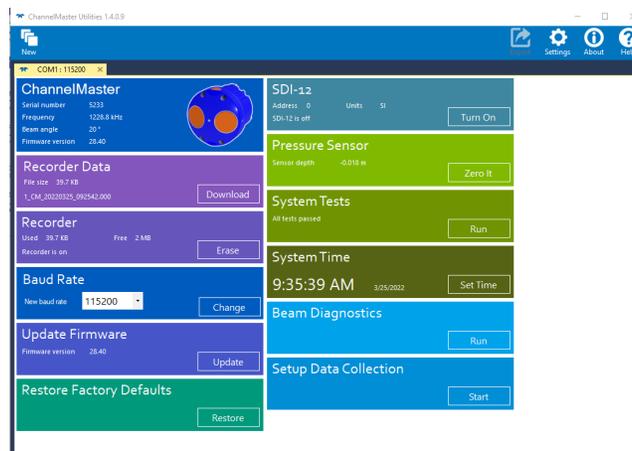
Preparing the ChannelMaster

PREPARING THE CHANNELMASTER INCLUDES THE FOLLOWING STEPS:

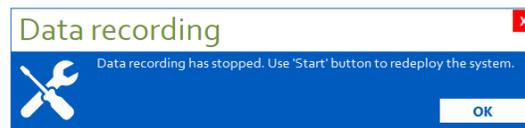
- ✓ Setting the ChannelMaster clock
- ✓ Testing the ChannelMaster
- ✓ Zero the Pressure Sensor
- ✓ Filling pressure sensor with oil
- ✓ Checking for firmware updates

Pre-Deployment Checks

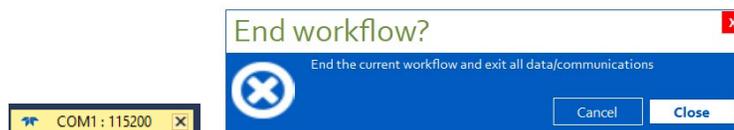
ChannelMaster Utilities software has a user-friendly interface for running the pre-deployment checks. Select the **Utilities and Updates** button when connecting to *ChannelMaster Utilities*.



When the **Utilities and Update** screen is first opened, click **OK** at the Data recording message box to continue.



When done using the **Utilities and Update** screen, click the x on the session tab and then click **Close**.



Downloading Recorder Data

Download data from the ChannelMaster's recorder as needed.

To download data:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Click the **Download** button. Data files are saved to the Working Folder based on the system serial number and date.

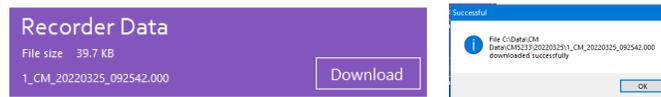
Station number is empty:

Path selected in Working Folder\`CMxxxx\YYYYMMDD\CM_YYYYMMDD_HHMMSS.000`

Station number entered:

Path selected in Working Folder\`#####\YYYYMMDD\#####_CM_YYYYMMDD_HHMMSS.000`

Where `CMxxxx` is the system serial number, Date, `#####` is the station number, and `YYYYMMDD_HHMMSS` is the date and time.

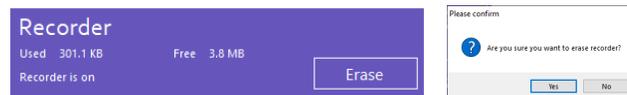


Erasing Recorder Data

Use this procedure to erase all data on the recorder. Make sure to download the data first.

To erase the recorder:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Click the **Erase** button. Click **Yes** to continue.



Changing the Baud Rate

The ChannelMaster default baud rate is 9600. Using higher baud rates will allow for faster pinging. However, higher baud rates are more susceptible to noise and may result in poor communications. Therefore, it is highly recommended when using cables 25-meters and longer that you use RS-422 communications (instead of RS-232 communications) or use a baud rate of 9600. It may not be possible to use RS232 communications with long cables (>50m) and therefore you should test your communications setup with the actual cable you intend to use before you deploy.

To change the Baud rate:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Enter the new Baud rate in the drop-down list and click **Change** on the Baud Rate box.

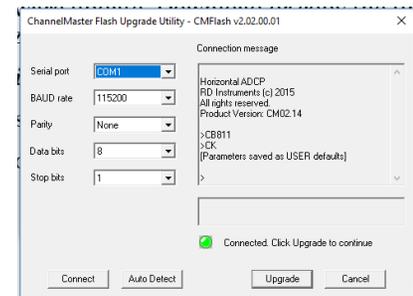


Checking for Firmware Updates

The *ChannelMaster Utility* software shows the firmware version in the System box. When new firmware is released, TRDI provides a firmware update package.

To update the ChannelMaster firmware:

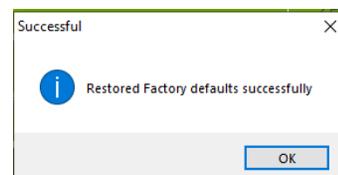
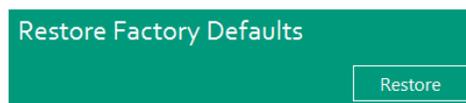
1. Refer to [Installing Documentation and Software](#). Once you have secured an account, go to <https://tm-portal.force.com/TMsoftwareportal> to access firmware updates with your unique username and password. Download or copy the firmware update file to your computer's hard drive and unzip the file.
2. Run the *CM_FW_2.xx.exe* file (where *xx* is the firmware version) to install the firmware on a computer. This will place a shortcut on the desktop.
3. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
4. Establish communications to the ChannelMaster by clicking on the **Connect** button.
5. Click on the **Update** button.
6. Point *ChannelMaster Utilities* to the desktop shortcut added in step 2 and click **Open**.
7. Click **I Agree** at the firmware EULA.
8. Click **Start**.
9. Click **Upgrade** to continue.
10. Wait for the *Firmware upload successful* message. Click **Exit**.
11. Verify the firmware version has been updated.
12. Use Windows Control Panel® to uninstall the firmware update file.



Restore Factory Defaults

To reset the ChannelMaster to the factory default settings:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Click **Restore**. This will send the ChannelMaster the CR1 command and sets all commands to their default values.

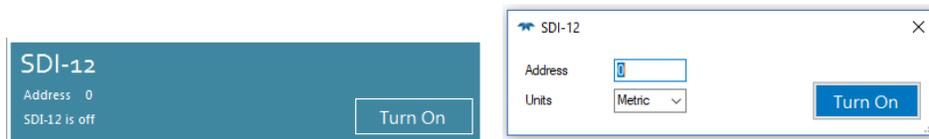


Do **NOT** use this function if the system is setup to collect index velocity data for a specific site.

SDI-12 Settings

To use SDI-12:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. On the **SDI-12** box, click **Turn ON**.
4. Set the ChannelMaster address and units, and then click **Turn On**.

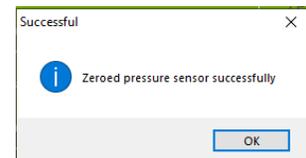


SDI-12 will not function while the *ChannelMaster Utilities* software is connected.

Zero the Pressure Sensor

To zero the pressure sensor:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Place the ChannelMaster in the water so that the vertical beam is at the water surface.
4. Click **Zero It**. This will zero the pressure sensor. Click **OK** at the **Zeroed pressure sensor successfully** screen.



Filling the Pressure Sensor Cavity with Oil

The pressure sensor cavity needs to be filled with oil before deployment to deal with both trapped air and long-term reliability of the pressure sensor. Use Dow Corning Q7-9120 Silicone fluid, 12,500 CST oil. A plastic bottle with silicone oil (part number 75BK6004-00) is included in the spare parts kit.

Use a straight-slot screwdriver to remove the copper port screw on the pressure sensor. Place the tip of the bottle over the screw hole. Ensure the plastic bottle tip is not inserted into the screw hole. Slowly administer the oil into the cavity through the hole. Allow time for the air to escape as you fill. Once the oil level is up into the port screw hole, then stop filling. Install the copper port screw slowly, allowing time for the oil to pass through the port screw orifice.

The sensor cavity can be filled any time before system installation; however, care should be taken to keep the ChannelMaster from high temperature during this time. High temperatures may cause the oil to leak.



The pressure sensor cavity is not filled with oil when shipped. This must be done before deploying the ChannelMaster. The pressure sensor cavity should be checked and if needed refilled between deployments.

Testing the ChannelMaster

To run the tests on a ChannelMaster:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Click on the **Run** button.
4. Click **OK** at the **All tests passed** screen.



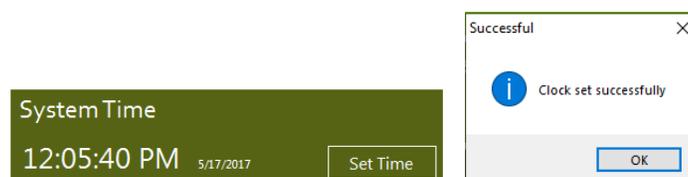
If the Pressure Sensor test fails, zero the pressure sensor and run the test again. If any other test fails, read Chapter 6 in the ChannelMaster Operation Manual. The System Tests runs the pre-deployment test. If the test fails, use *TRDI Toolz* and run the PA command.

Setting the ChannelMaster Clock

The real-time clock (date and time) within the ChannelMaster maintains the correct time while system power is removed. The clock will continue to maintain the date and time during power outages of 16 to 24 hours. If power is removed from the ChannelMaster for a longer period of time, then the clock reverts to the default value of January 1, 1970, and needs to be reset to the correct time.

To set the ChannelMaster's clock to match the PC time:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Click **Set Time**. Choose **Set Local** or **Set GMT**.
4. *ChannelMaster Utilities* will set the clock to match the PC's time or GMT. Click **OK** at the **Clock set successfully** screen.



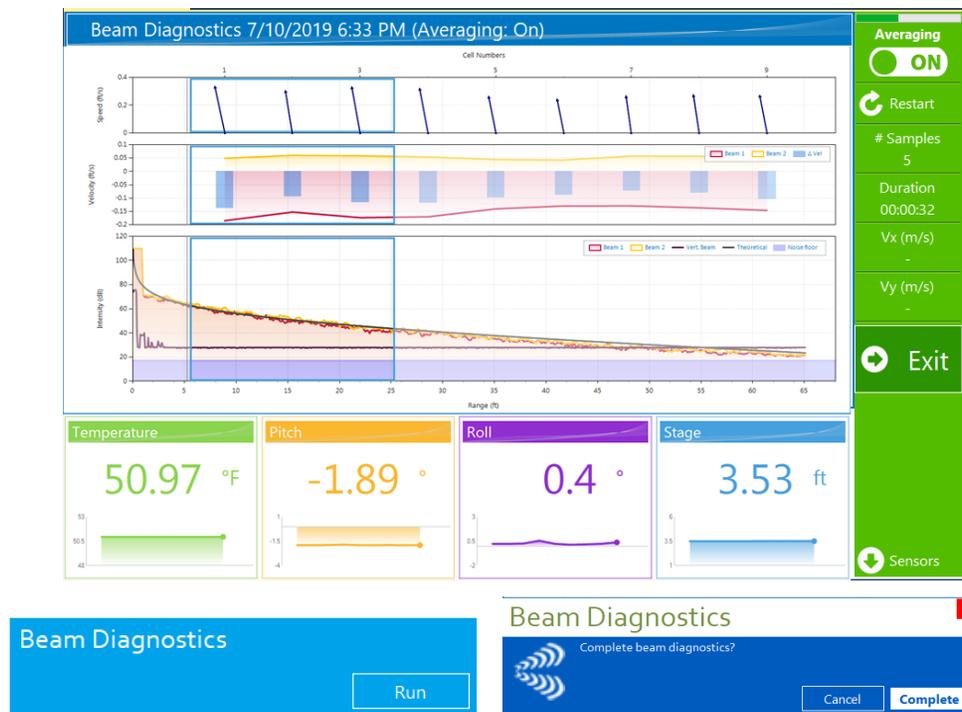
Use the **Setting** screen to switch between local time and GMT. See the ChannelMaster Utility help file for details.

Running a Beam Diagnostics Test

The Beam Check is the most important parameter for ChannelMaster data quality control and assurance. TRDI recommends the user examine the Beam Check during the installation to make sure the profile does not show anything abnormal. The velocity data will be questionable if the Beam Check is abnormal. The Beam Check should also be monitored during the ChannelMaster operation.

To run a beam diagnostic:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. The ChannelMaster should be mounted as it will be deployed.
4. Click **Run**. The beam diagnostic screen displays the data. Click **Exit** to end the test and then click **Complete**.



Collecting Data



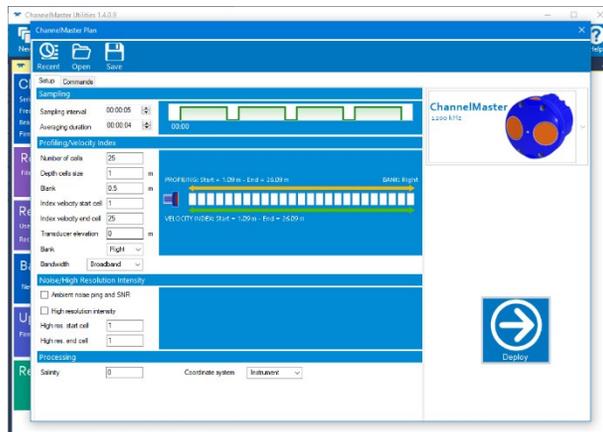
Use this to change the data collection setting or to collect data for test purposes. Use the **Real-Time Maintenance and Monitoring (USGS)** workflow for collecting Index Velocity data.

To start collecting data:

1. Start *ChannelMaster Utilities*. Click on the **Utilities and Updates** radio button.
2. Establish communications to the ChannelMaster by clicking on the **Connect** button.
3. Click **Start**.
4. Enter the setup parameters or open a command file. A command file can be created/edited using the **Offline Planning** screen on the main screen (see the ChannelMaster Utilities help file for details).
5. Click **Deploy**. Save the command file when prompted.
6. On the Successful dialog, click **Close**. The ChannelMaster will deploy and the session with *ChannelMaster Utilities* will end.

Setup Data Collection

Start



Successful



Deployment started successfully. SDI-12 is turned off (ChannelMaster will not respond to SDI-12 commands) and autonomous logging will start at 4/12/2019 2:56:00 PM. The session will now close.

Close

Sampling

Sampling Interval – By default, the ChannelMaster pings every 0.5 seconds. All pings in the sampling period are time averaged before being recorded. Set the time average interval to control how much data is averaged together.

Profiling/Velocity Index

Number of Cells – Set the number of water profiling range cells to cover the maximum expected range of the ChannelMaster. The profiling range is 25 meters for a 1200 kHz system, 90 meters for a 600 kHz system, and 300 meters for a 300 kHz system.

Depth Cell Size (m) – Sets the length for one cell measurement.

Blank Distance (m) – The blanking distance should be set to 0.5 to 2 meters to maximize the ChannelMaster performance and minimize the unmeasured layer near the ChannelMaster. The display shows the distance from the transducer to centroid of the cell. The distance to the middle of cell #1 is a function of blank after transmit (WF), cell size (WS), and speed of sound. The fixed leader data, bytes 33 and 34 contains this distance. For more information, see the WF command in the ChannelMaster ADCP Guide.

Index velocity start/end cell – The range averaged velocity is the index velocity used to calculate discharge. The range-averaging interval should be determined so that the corresponding Index-velocity has the best correlation with the channel mean velocity at the site.

Transducer Elevation – Set the elevation of the ChannelMaster transducer faces above a local datum. This value is used by the ChannelMaster to calculate the water surface level (stage).

Bank – Select the **Right** or **Left** bank. When looking downstream, the right bank is on the right side.

Bandwidth – Select **Broadband** or **Narrowband**. Narrow bandwidth allows the ChannelMaster to profile farther, but the standard deviation is increased by as much as 2.5 times. Broadband is the default.

Noise and Signal to Noise /High Resolution Intensity

Ambient noise ping – Samples the ambient sound Received Signal Strength Indicator (RSSI) before the water ping. Ambient Noise is used as a factor in calculating the Signal to Noise Ratio (SNR). Selecting this box enables the Ambient Noise Measurement output data format (see the ChannelMaster ADCP Guide, chapter 8).



Turn off noise collection when ping timing is critical. Adding a separate RSSI and noise calculation adds processing time and can minimally slow ping timing.



Noise and Signal to Noise features are tied together. You won't get SNR without enabling the **Ambient noise ping** feature.

High resolution intensity – Selecting this box enables the Enhanced RSSI data and the full resolution average (± 0.1 counts) will be reported in the Enhanced Resolution RSSI data format (see the ChannelMaster ADCP Guide, chapter 8).

High res. Start cell – Select the starting cell.

High res. End cell – Select the ending cell.

Processing

Salinity – Enter the salinity of the water. Freshwater is 0, saltwater is 35.

Coordinates for Velocity – Select **Instrument (X-Y)** or **Beam**.

Quick Review

	
<ul style="list-style-type: none"> ✓ All maintenance items (as needed) were done including filling the pressure sensor with oil and zero pressure sensor. 	<ul style="list-style-type: none"> 🔗 Read Chapter 4 in the ChannelMaster Operation Manual for full maintenance information.
<ul style="list-style-type: none"> ✓ Check TRDI's website for firmware updates. 	<ul style="list-style-type: none"> 🔗 Refer to How to Contact Teledyne RD Instruments. Once you have secured an account, go to https://tm-portal.force.com/TMsoftwareportal to access firmware updates with your unique username and password.
<ul style="list-style-type: none"> ✓ Use the Real-Time Maintenance and Monitoring (USGS) workflow for collecting Index Velocity data. 	<ul style="list-style-type: none"> 🔗 See the ChannelMaster Utilities help file for information on using the USGS workflow.

Conclusion

Congratulations! You have completed the ChannelMaster Deployment Guide. Read the following chapters in the ChannelMaster Guide for more detailed information.

-  **Chapter 1 – Overview**
This chapter includes an overview of the ChannelMaster features, computer, and power requirements, and connecting to the ChannelMaster.
-  **Chapter 2 – Installation**
Use this chapter to plan your installation requirements.
-  **Chapter 3 – Data Collection**
Use this chapter to collect SDI-12 data.
-  **Chapter 4 – Maintenance**
This chapter covers ChannelMaster maintenance. Use this section to make sure the ChannelMaster is ready for a deployment.
-  **Chapter 5 – Troubleshooting**
This chapter covers how to troubleshoot the ChannelMaster. If the ChannelMaster fails a built-in test or you cannot communicate with the system, use this information to help locate the problem.
-  **Chapter 6 – Returning Systems to TRDI for Service**
Use this information to obtain a Return Material Authorization (RMA) number if the ChannelMaster needs to be returned to TRDI.
-  **Chapter 7 – Commands**
This chapter defines the ChannelMaster commands.
-  **Chapter 8 - Output Data Format**
This chapter explains the output data format used by the ChannelMasters.
-  **Chapter 9 – Specifications**
This chapter includes specifications and dimensions for the ChannelMaster (including outline installation drawings).

PDDecoder Library in C language

The Teledyne Marine PDDecoder library is an open-source library written in C language to decode the PDO data formats that are commonly output by Teledyne Marine/Teledyne RD Instruments ADCPs. The definition and details of the PDO format can be found in any of the manuals under the section, Output Data Format.

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