

## **Podcast: Programming a Satlink DCP to record data from a Sontek ADVM**

*Recording time is about 15 minutes*

### **Slide 1/2: (Overview slide with title AND slide that has pictures of ADVM and Satlink)**

Welcome. This is a podcast produced by the USGS Hydroacoustics Work Group to demonstrate how to program a Sutron Satlink Data Collection Platform (DCP) to record data from a Sontek Argonaut acoustic Doppler velocity meter or ADVM. Sontek ADVMs are capable of measuring a variety of parameters that may be used to compute discharge at an index-velocity streamflow station. During this podcast, guidance will be provided on selecting those parameters that are of most use during the operation of an index-velocity station, and then configuring a Satlink DCP to record and transmit these data. (click) It is assumed you are already familiar with some of the basics of programming Satlink DCPs (arrow), as well as the selection and programming of site-specific parameters for Sontek ADVMs (arrow). Keep in mind that the use of trade names does not imply endorsement by the USGS.

Programming a DCP to record and transmit data is a basic task that must be performed when beginning the operation of a streamgage. This is no different when establishing an index-velocity station. The first step in this process involves the configuration of the ADVM that is being used to measure the index-velocity data. A variety of parameters are required to configure the ADVM based on your site conditions – these can generally be categorized as those controlling the physical location of where the data are collected in the environment and those controlling the timing of data collection.

### **Slide 3: (Basic discussion on ADVM programming – intro software and basic parameters, then provide example diagram)**

During this podcast, no effort will be made to provide detailed explanation of how these parameters are selected or how to program the Sontek ADVM. For this, additional information can be found at the USGS Hydroacoustics Web site at <http://hydroacoustics.usgs.gov> in the Index Velocity Section, as shown on the left side of the page (click).

An example will now be provided to illustrate how an ADVM might be configured and how these parameters are used when programming a DCP.

#### **Slide 4: (ADVM Parameters dealing with sample cells)**

This slide provides a listing of selected parameters that are used to configure a Sontek SL ADVM. The figure at the bottom of the page is used to illustrate each of these parameters.

When programming the ADVM, it is common to record data from both the range averaged cell and from several smaller “multi-cells”. For the range average cell, you set the Cell Begin ([click](#)) or CB and the Cell End ([click](#)) or CE. In this example, the instrument is set to begin recording data 3 meters from the face of the ADVM and to continue for 20 meters; the total range average cell is 17 meters in length.

To enable multi-cell data, the Profiling Mode (or PM command) is used in the ADVM. Once this is enabled, you must also specify the number of cells to use. With most Sontek ADVMs, this can be set up to a maximum of 10 cells.

\*\* One thing to note: when using a Sontek SL ADVM, data from only 3 of the multi-cells can be output using SDI-12. In many instances, the ADVM may be programmed to recorded more than 3 multi-cells internally. However, only the first 3 cells will be available via SDI-12. \*\*

So, in this example the Number of Cells (NC) is set to 4, as you can see at the bottom ([4 clicks](#)). The Cell Size or CS command sets the size of Each of these cells ([4 clicks](#)). In this example, CS is set to 4 meters. Finally, the Blanking Distance ([click](#)) or BD command is used to tell the instrument how far from the face of the ADVM to wait before starting data collection. In this example, a value of 3 meters is used. It is standard practice to set Cell Begin (CB) and Blanking Distance (BD) to the same value.

#### **Slide 5: (ADVM Parameters dealing with timing)**

The last two parameters that are configured in the ADVM are used to control the timing of data collection ([click to new slide](#)). These parameters are the Averaging Interval (or AI) and the Sample Interval (or SI). These parameters are described on this slide, and illustrated by the figure at the bottom of the page.

When recording data using an external device, such as a DCP, the value of the sample interval programmed in the ADVm is not important. Instead, the sample interval is controlled by the DCP. Th

In particular, for this example the Average Interval is set to 7 minutes and the Sample Interval is set to 15 minutes. This means that, at the beginning of a measurement cycle, the ADVm will start collecting data, or pinging, and continue for 7 minutes. Then, it will compute the average velocity (and other parameters) for that 7 minutes and log that value. Then, the instrument will wait 8 more minutes (to the next 15 minute time interval) and then start over. This describes how the data are logged using the internal ADVm data logger. However, when recording data using an external device, such as a DCP, the value of the sample interval programmed in the ADVm can be overridden by the sample interval used by the DCP. The process is as follows; ([click to new slide](#))

#### **Slide 6: (Schematic of DCP to ADVm timing)**

An ADVm is setup with an AI of 5 minutes and a SI of 15 minutes. A DCP is connected to the ADVm and is programmed to record data from the ADVm every 15 minutes. At 1:00 ([click](#)) the DCP sends a SDI measure command ([2 clicks](#)) to the ADVm and the ADVm starts to ping and collect data ([click](#)). After the average interval passes (5 minutes; therefore, 1:05) the ADVm stops collecting data and does internal computations to determine average values for selected parameters. ([3 clicks](#)) Due to computation time, and additional time needed for SDI-12 communications, additional time passes and ([2 clicks](#)) the data are finally transmitted back to the DCP at approximately 1:05:30. These values are stored in the DCP logger and time stamped as the 1:00 reading. ([click](#)) Note: because the SI value was set to 15 minutes as well, the same average values will be stored in the ADVm internal data logger.

#### **Slide 7: Listing of ADVm parameters**

This slide provides a summary of the parameters that are being used to configure the ADVm for this example.

When programming the DCP to record data from the ADVm, you must determine which parameters are of interest. There are always 8-parameters available for range-averaged sample cell; these are water temperature, mean pressure, water level, cell end, velocity-x, velocity-y, velocity-magnitude, and signal strength.

When using the Multi-Cell Option, there are 4-parameters available for each cell; velocity-x, velocity-y, velocity-magnitude, and signal strength.

\*\* Once again, note that when using a Sontek ADVN, data from only 3 of the multi-cells can be output using SDI-12. In this example, the ADVN is programmed to use 4 multi cells; therefore, only the first 3 cells will be available via SDI-12 output.

Another limiting factor is the maximum number of sensors that you may record with your DCP. For the Satlink , you may only record up to 16 parameters – therefore, you should select those parameters that provide most useful data. (3 clicks). Pressure and velocity magnitude (both range averaged and multi-cell) provide the least amount of information and are typically not recorded by the DCP. Therefore, in the example that will shown, the DCP will be programmed to record the remaining parameters. (click)

### **Slide 8: Slide showing SDI-12 specifications for various parameters to be used in Satlink**

This table is a complete listing of the selected parameters, along with specifications related to the SDI-12 output format that will be used to retrieve them from the ADVN and store them in the Satlink DCP. To retrieve the range averaged data the command M! is used (click). This command will tell the ADVN to send back all 8 parameters available for this cell – the dcp is then programmed to only record those values of interest by specifying their unique SDI-12 Parameter number (click) as shown.

Similarly, for the Multi-Cell data, the appropriate SDI-12 command and unique SDI-12 Parameter Number will be specified in the DCP. The SDI-12 command for each cell is slightly different; for Cell 1, you use the command M1! (click) as shown. Then, to record those parameters of interest, the unique SDI 12 Parameter Number is specified (click). Similarly, for Cell 2 data the command is M2! (click) and the Parameter Numbers are shown (click) and for Cell 3 data the command is M3! (click) and the Parameter Numbers are given (click).

These information will now be used to provide a demonstration of programming a Sutron Satlink DCP to record these data.

\*\*\* Stop PPT and Open Satlink Software \*\*\*\*\*

First, the vendor supplied software, Satlink Logger Communicator, is opened. When connected to a DCP it will show this message –

Once connection is established, selected “Proceed to Setup” .

1. Setup individual sensors in **Measurement** Tab of Satlink Logger Communicator Software

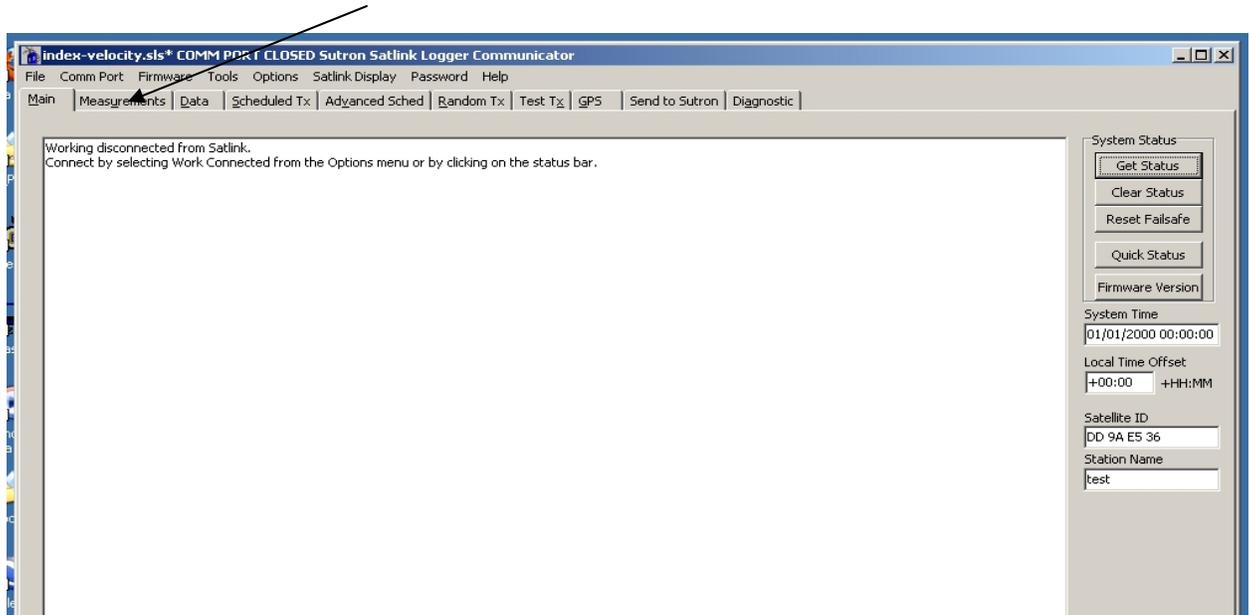


Figure 2 – Basic Sutron Satlink Logger Communicator Screen

2. For each parameter, you will follow these steps. In the Settings section, choose the lowest numbered **Index** from the drop-down choice. Check on the **Active** option, then input the parameter name in the **Label** field. This will then be shown just above in the **Index** field. In the Schedule section, set the **Interval** to the appropriate recording time increment. In the Measurement Type section, select **SDI-12**. Select the appropriate Sdi-12 Address for the velocity meter – this is the number **0** in this example. If the data are going to be transmitted then check the **Include** box in the Scheduled Transmissions section in the lower right corner. Depending on the data interval, and the transmit interval, the **Num vals to Tx** must be set as well – for a 15-minute data interval that are transmitted every 1 – hour, a value of 8 is chosen to provide redundant data transmissions.

Each parameter will have its own **SDI-12 Cmd** and **SDI-12 Param** number (found in Measurement Type section).

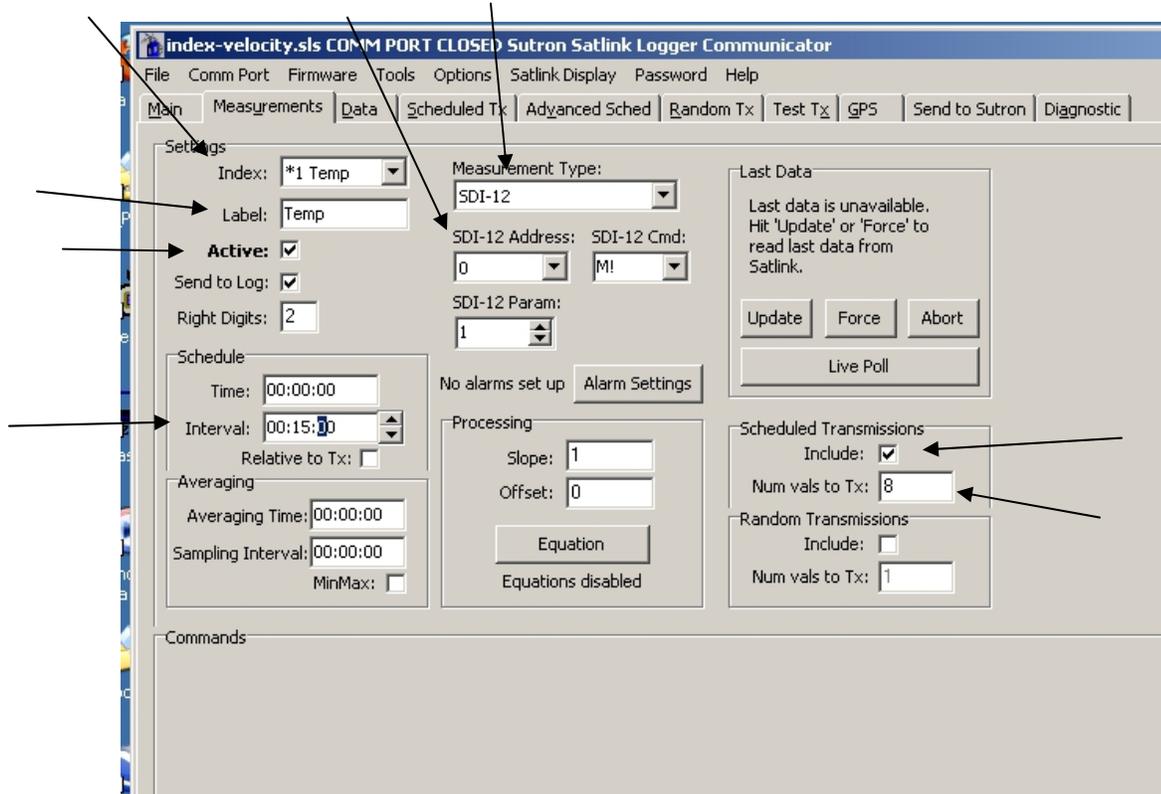
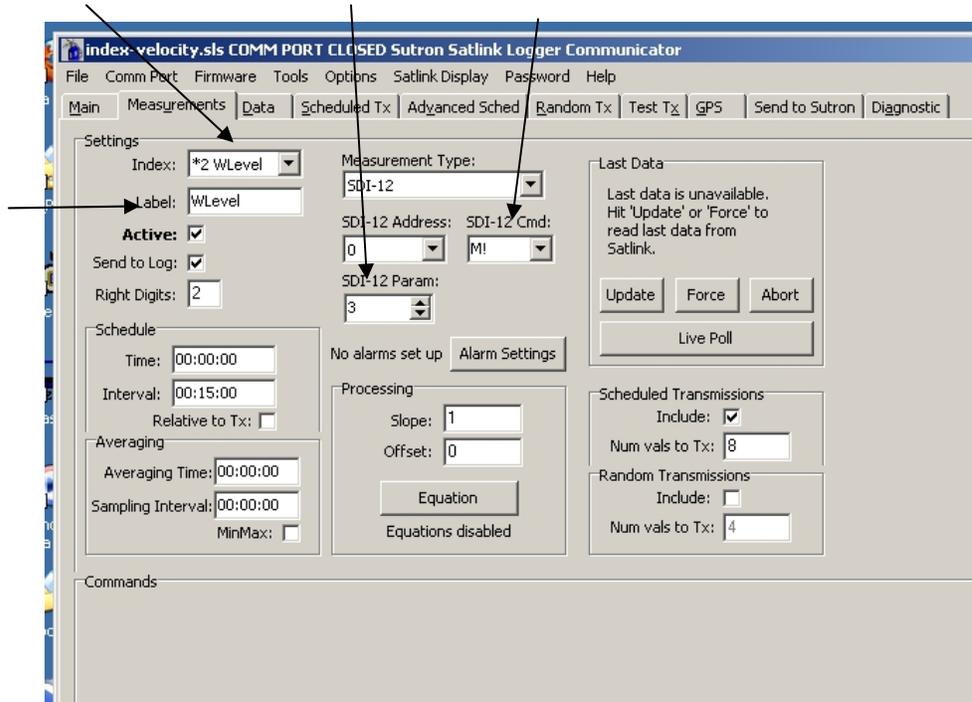
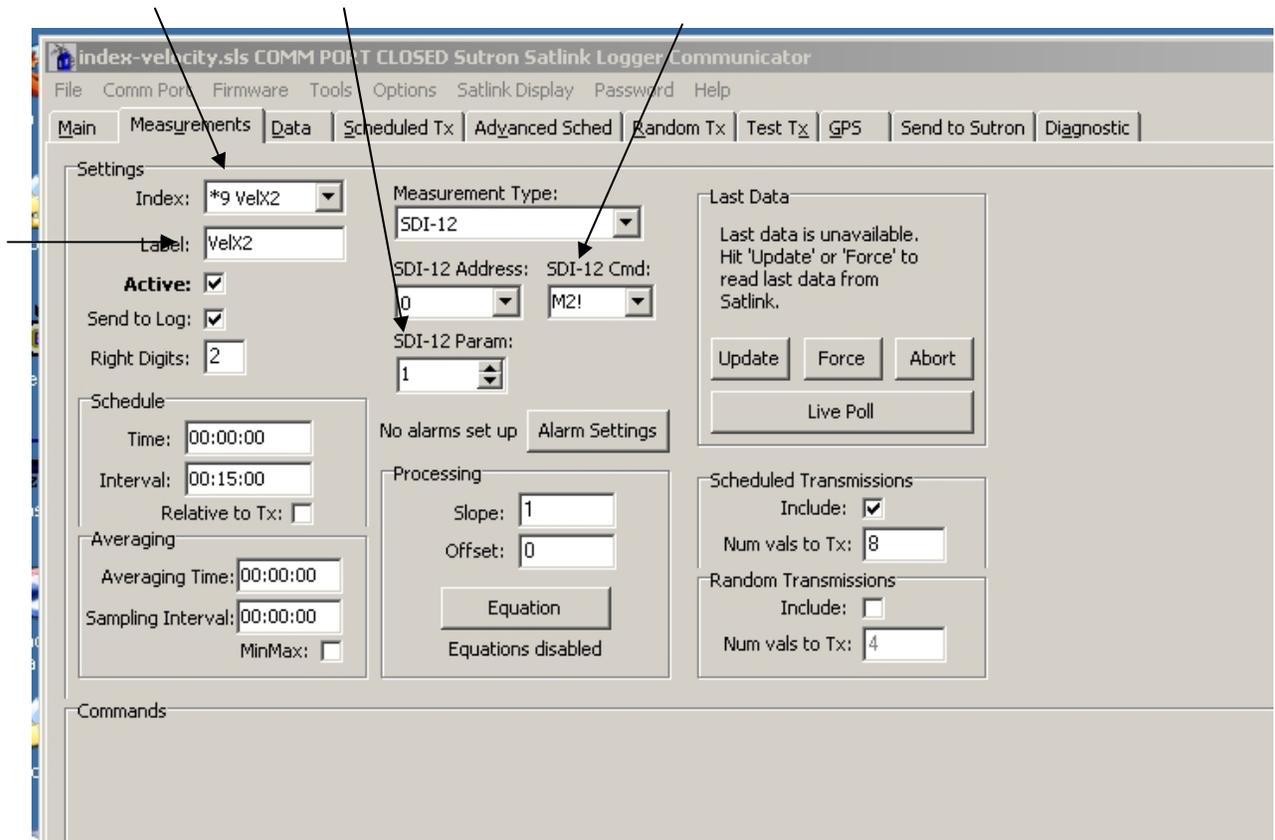


Figure 3 - Measurement setup for Water temperature of overall cell

- Once this is done for one parameter, you will repeat the process by choosing the next available **Index** number in the Settings section and changing the **SDI-12 Cmd** and **SDI-12 Param** to values indicated above. For instance, for Water Level the Index number would be 2, the SDI-12 command would still be M!, and the SDI-12 Param would change to 3 (see below).



- Continue this for **Index** values 1 to 6, which are the Range Average sample cell parameters. Note: In each instance, the **SDI-12 Cmd** stays the same (M!) but the **SDI-12 Param #** changes.
- For the individual cell parameters (**Index** values 7 to 15) both the **SDI-12 Cmd** and the **SDI-12 Param** values change slightly; Cell 1 uses the M1! Command, Cell 2 the M2! Command, etc. For instance, for Velocity-X in Cell 2 the **SDI-12 Cmd** would be M2! And the **SDI-12 Param** is 1 (see below);



- Setup Measurement information for each of the 12 parameters, then continue to the **Scheduled TX** tab and **Random Tx** tab and input Satellite information as usual.

Once the dcp program is set, you should save a copy (show) then you must send a copy to the DCP – click this button and select Stop – Send – Start. Once you do, the program will be pushed in the Satlink and it will start running. To verify SDI-12 communication you can hit blah blah and the data from the ADVM should appear after the average interval has passed. For demonstration purposes, the AI in this ADVM is set to 10 seconds – typically, your ADVM will have a much longer Average Interval (2 minutes and over) so it will take longer to receive the data back.

\*\*\* Now, show last slide in PPT \*\*\*

**Slide 9:**

This concludes our USGS HAWG podcast on how to program a Sutron Satlink DCP to record data from a Sontek ADV. If you'd like to learn more, please visit [hydroacoustics.usgs.gov](http://hydroacoustics.usgs.gov). Thank you.